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The HP 3000 Series 44

Top-End HP 3000 Hikes Price/Performance 90%

By Jeffry Beeler

CW West Coast Bureau
PALO ALTO, Calif. — Hewlett-

Packard Co. last week extended the high end of its most powerful processor family by announcing a system that reportedly boasts 90% better price/performance than the company's previous top-of-the-line model, the 3000 Series III.

The 3000 Series 44, HP's latest highend systems addition, provides twice the processing power of the Series III for just a 5% increase in price, a company spokesman said.

Among its key features, the Series 44 is said to provide a significantly enhanced version of the MPE-III operating system long available with the

Support for HP's recently announced operating system revision, dubbed MPE-IV, is currently limited to just the Series 44.

By the end of the first quarter of next year, MPE-IV support is expected to be extended to the rest of the Model 3000 processor family as well, the spokesman predicted.

In addition to the top-of-the-line Series 44, the 3000 family currently consists of the Series 30 and 33 as well as the Series III.

Key Element

Another key element in last week's Series 44 introduction was the announcement of an optional service agreement that entitles users to financial compensation if their top-of-theline systems' downtime exceeds 1% a month.

The guaranteed uptime service agreement gives HP a strong incentive to make sure that a Series 44's critical systems modules - processor, main memory and disk storage - consistently operate at a 99% or better reliability level, the spokesman said.

In other product developments, HP last week introduced the Model 2680 (Continued on Page 4)

HP Guarantees 99% Uptime

PALO ALTO, Calif. - Responding to the growing user demand for increased product reliability, Hewlett-Packard Co. is offering its justannounced 3000 Series 44 processor with a money-back guarantee of at least 99% hardware uptime.

The guarantee forms the centerpiece of an optional maintenance agreement that adds 7.1% to the cost of a normal, full-time service contract and covers a Series 44's pro-

(Continued on Page 4)

Honeywell Doubles Bits **Unwrapping DPS 6**

CW Staff

BILLERICA, Mass. Honeywell, Inc. last week unveiled a 10-processor family of computers - including two 32-bit systems - that it said has double to triple the power of the firm's Level 6 minicomputer for a cost of about 10% to 20% more.

The two 32-bit computers in the DPS 6 series lineup represent the company's initial push into the highly competitive "supermini" market and are directly targeted against Digital Equipment Corp.'s VAX-11/780 and newer VAX-11/750. In addition, four of the DPS 6 family's eight 16-bit computers can be field-upgraded to fully compatible 32-bit systems, reportedly an industry first.

To accommodate its new systems, Honeywell also unwrapped an up-dated version of its Gcos Mod 400 operating system. The software features enhancements that increase system availability, improve memory utilization and boost file system capabilities, according to a Honeywell spokesman.

The DPS 6 computers - or "Solution consist of the low-end Systems" -DPS 6/30, 6/32, 6/34 and 6/38; the medium-range 6/48, 6/54, 6/74 and 6/76; and the top-of-the-line 32-bit 6/92 and 6/96

The architectural roots of all these systems are based on the Level 6 minicomputer, enabling them to run any programs or applications developed on the Level 6 without prior software



Stephen G. Jerritts, president of Honeywell Information Systems, week reassured Level 6 users the firm will not abandon them. The newly announced DPS 6 series was not designed to replace the four-year-old processors, he said. Story on Page 6.

Unlike their closest competitor and other 32-bit rivals, the DPS 6 computers are lobol-oriented and feature a business-slanted commercial instruction set.

Also, since the machines were designed to fit into the company's Distributed Systems Architecture (DSA) (Continued on Page 6)

Pouzin Explores 'Seven Plagues of the '80s'

By John Whitmarsh

CW Staff

LONDON - For all the blessings of computer technology, a number of curses - most of the industry's own making - remain.

Louis Pouzin, director of pilot pro-jects at the Institut de Recherche d'Informatique et d'Automatique (Iria) in Paris, called them the plagues of the '80s."

The problems, which he discussed before an audience at the Infotech State of the Art review here recently, include:

interface mismatches. • Human "Here is precisely where human beings and computer systems are light-years away from each other," according to Pouzin. "We do not handle the same abstractions.

Humans communicate with computers in their language. "Granted we do not use binary or assembly codes, but the difference is only superficial," Pouzin noted. "We use keywords, syntax, keys, menus, optional or positional control arguments and so on. Anything offered to us is nothing but a mapping of a subroutine call, and we are supposed to be the 'main' pro-

• Communication gaps. Public data networks are growing up, but are they growing more public? Not in the sense of the public telephone system, which has a phone booth on every corner, a telephone directory in every booth, an operator for assistance and a dial to reach any number in the world. None of this applies to the so-called public data networks, Pouzin said.

First, there is no public terminal (Continued on Page 2)

Analyst Finds 3081 Disappointing, **But He Expects Dramatic Changes**

By Tom Henkel CW Staff

MONTREAL - IBM's 3081 processor offers no new functions, uses a jury-rigged cooling system and gives less performance for the dollar than Amdahl Corp.'s 5860 processors - but

things will change.

cipated as the H series.

That was the opinion of Robert Fer-tig, president of Advanced Computer Techniques Corp.'s (ACT) Technology Analysis Group, on IBM's Nov. 12 announcement of the machine, long anti-

Speaking at last week's Future Systems Forum Canada, Fertig said IBM has some dramatic changes planned for the 3081 over the next three to six months

• IBM has left the door wide open to add 31 more bits of addressable storage to the 3081 processor.

• The vendor could make the 3081 considerably faster by announcing a specialized version of MVS/SP as the 3081's native operating mode.

• Throughput could be further

(Continued on Page 8)

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Pouzin Sees 'Seven Plagues of '80s'

(Continued from Page 1) anywhere. Second, there are no directories with numbers and call procedures. Third, there is no assistance. And finally, it is very likely that the computer we want to dial is not accessible for some reason. What is accessible - and how - is presently a wellkept secret," Pouzin said.

Even when computers are available through the public networks, using them is "extremely hard and painful" because of antiquated switching plants, noise, wrong or busy numbers, disconnections and expensive longdistance telephone charges. Moreover, in most countries the maximum speed is 30 char./sec, which is totally inadequate for display terminals.

Data networks work no better than any computer installation that keeps being upgraded," Pouzin said, adding that a transatlantic virtual circuit between France and the U.S. goes down about once an hour and that circuit lifetime on some evenings is as little as 10 minutes

This plague of continuous instability appears to have no cure for at least another decade. New networks develop, older ones are rebuilt, new procedures are introduced, new software is phased in with new errors, numbers change and so do expectations. Before it gets better, it is distinctly getting worse. This trend is not likely to change soon.

· Lack of Support. Since public data networks are new and expanding fast, customer support has not yet reached a satisfactory level. A more fundamental cause, Pouzin claimed, is that public data networks have been designed without functions for customer sup-

"In the telephone and telex systems, we use the same terminal for talking to our correspondents and to telephone/telex operator. There is no such thing in data networks," Pouzin

The problem worsens with international networks. "Without exception, every carrier is proficient in explaining

that the trouble is caused by another carrier and that they cannot help. This finger-pointing syndrome is well known, as it has always been the hallmark of international communica-

Additional coverage of Infotech appears on Pages 10, 11 and 12.

"Since the territorial division of the world in national monopolies is not likely to change soon, the built-in irresponsibility in international communications is also likely to remain," Pouzin predicted.

· Pseudo-standards. Pouzin believes the most popular standard in data communications is the V24 interface because it provides easy interconnection between equipment of various makes and because it does little except pass bits.

The X.25 packet interface, however, is going in an opposite direction," Pouzin said. "The written description takes more than 100 pages in natural English, which means that X.25 is a

system in itself. The consequence is that the interpretation of such a bulky document is necessarily ambiguous. In addition, the standard provides for many incompatible national and subscriber options, and interconnection between two X.25 interfaces is only possible if they have been carefully engineered with compatible options, according to

While standards for real circuit interfaces (V24, V35, X.20, X.21) are now reasonably stable, standards for packet networks (X.25, X.28, X.29) are a moving target," Pouzin charged. "Between the initial version in 1976

and the present one in 1980, there have been a number of changes, deletions, additions, options and explanations which have doubled the size of the document.

Since there is no commonly agreed

market pressures and national interests are going to produce frequent ad-justments, whether or not they will be officially standardized.

· Reliability. The rise of the data networks has increased the amount of equipment that must function properly and simultaneously, but human and system failures and the lack of any realistic redundancy limits service on a data network to no more than 80% of availability, Pouzin said.

Despite the higher intrinsic reliability of modem technology, the unstable environment of data networks produces a deterioration at global level. And as long as instability remains, reliability will go up and down," Pouzin believed.

• Regulations. While the present policy in the U.S. is to eliminate most forms of communications regulation in favor of the marketplace, that is not the policy in Europe. The tradition here and in the rest of the world is to regulate not the common carriers but their potential competitors.

"Owing to their status of state administrations, postal, telephone and telegraph administrations are setting the rules to their own advantage for both domestic and international com-munications," Pouzin charged. "As they are also the ones who benefit from the rules, there is no reason to think that the freedom left to other businesses will expand at all. Nevertheless, fluctuations will appear when new services develop."

• Unemployment. Computer tech-

nology will take its greatest toll in the workplace and especially on produc-tion workers, Pouzin said. He believes it would take a wholesale restructuring of society to absorb laid-off workers.

"Thus the future will presumably be made of persisting conflicts between technology and sociology. As people tend to become emotional when their own lifestyle is at stake, there is no reason to believe that technology will be assessed on its own merit. It is more likely to be associated with the social enemy and viewed as a threat."

This Week

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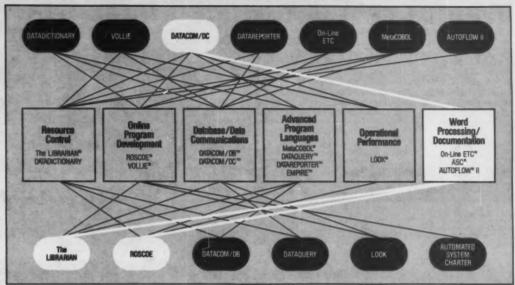
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HP Brings Out 3,000 Line/Min Laser Printer

portedly simplify their forms design and thus cut their paper costs with a 3,000 line/min laser printer that operates under control of the Hewlett-Packard Co. 3000 systems family.

Introduced last week along with HP's 3000 Series 44 processor, the printer, designated the Model 2680, comes with an Interactive Design System (IDS). This is a software package that permits business forms to be generated electronically at the graphics terminal of a controlling HP 3000 processor.

Such forms are then transmitted to the printer, where they are automatically merged with their accompanying data during printing. The contents of the forms can come either from the controlling processor itself or from

any other HP 3000 CPU linked to it in network

By permitting forms to be designed electronically, the 2680 enables users to dispense with most of their costly preprinted forms, HP said.

The printer's IDS software package also reportedly aids in the design of special character sets, symbols, logos, formats and signatures. In addition, a second software package known as the Interactive Formatting System (IFS) permits the constituent sections of multipart forms to be integrated to form complete documents.

The HP 2680 does not contain trinitrofluorenone (TNF), as the IBM 3800 laser printer does, nor any other carcinogens or mutagens, according to HP officials. Instead, it uses carbon black and various plastic isomers that have been tested by an independent labora-tory and certified as safe, they said.

Designed primarily to operate as part of a distributed processing network, the 2680 prints 45 page/min, which translates to about 3.000 line/min.

The 2680 currently operates with HP's Series 30 and 33 processors as well as with the company's recently introduced Series 44.



HP 3000 Series 44 controls the 2680 laser printing system.

In fact, the only 3000 family member not now offering support for the laser printer is the Series III - a shortcoming HP expects to address sometime next year, probably during the spring, the spokesman said.

The 2680's \$121,000 price tag covers

the printer itself as well as the accompanying IDS and IFS software pack-

Deliveries of the system are slated to begin next February from HP at 1507 Page Mill Road, Palo Alto, Calif.

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Series 44 Hikes HP Price/Performance 90%

(Continued from Page 1)

laser printer, a 3,000 line/min unit that enables users to eliminate most preprinted forms and operates with all HP 3000 family processors except the Series III, whose 2680 support will probably begin next spring.

Last week's announcement also resulted in the addition of another member to HP's daisywheel printer line. The Model 2601A printer is said to produce letter-quality output at either 32- or 40 char./sec.

The Series 44, meanwhile, falls into roughly the same performance class as the IBM 4331 Group II and will compete directly with systems like the 4300 series machines and the IBM System/38, the spokesman said.

Performance Edge Much of the Series 44's apparent performance edge over the existing Series III reportedly stems from the larger machine's expanded main memory and disk-storage capabilities. The Series 44 holds up to 4M bytes of main memory, compared to a 2M-byte maximum for the Series III, and supports as much as 1.9G bytes of disk storage, twice the capacity of the next largest HP 3000 processor.

The Series 44 also owes its increased computing power to the machine's improved MPE-IV operating system, which boasts several advances over the existing MPE-III, including:

· A modified file manager to accommodate the top-of-the-line processor's expanded main memory requirements.

· An enhanced file system that reportedly streamlines the processing of disk-system I/O.

· A revised memory-management algorithm that purportedly simplifies

main memory handling.

Yet another source of the Series 44's expanded processing power is its improved logic circuitry, the spokesman

Unlike the Series III, which incorporates transistor-transistor logic and ex-

the Series 44 uses Schottky logic chips with a bit-slice approach that cuts execution times to 105 nsec.

Compatible with the other members of HP's 3000 family, the Series 44 supports all Series 30, 33 and III peripherals, except for a few paper tape and punch card units, the spokesman said. The top-of-the-line system also runs without recompilation - all Cobol, RPG, Basic and Fortran programs already operating on existing 3000- family processors.

Like its sister systems, the Series 44 supports HP's Image/3000 data base management system, Query/3000 data base inquiry language, V/3000 business forms and data entry software, and Ksam/3000 keyed sequential access method software.

Protocol Support

As a system optimized primarily for distributed processing applications, the Series 44 also supports three main-

frame communications protocols, including IBM 2780/3780, Hasp multileaving and 3270. In addition, the system communicates with multipoint terminals through HP's MTS/3000 software subsystem.

To upgrade a smaller 3000 family system to a Series 44, users merely swap their existing processor for the top-of-the-line model. A typical upgrade takes about eight hours and allows users to retain most if not all their original peripherals, the source said.

A basic Series 44 configuration incorporating a 1M-byte processor, four terminal ports, CRT terminal console, 50M-byte disk unit and 1,600 bit/in. tape unit costs \$109,445. The minimum system can be expanded in 512K-byte increments for \$10,000/increment.

Additional information about the Series 44 can be obtained from HP at 1507 Page Mill Road, Palo Alto, Calif. 94304.

HP Warrants 99% Uptime

(Continued from Page 1)

cessor, main memory and up to two system-domain disk units.

Under the guaranteed-uptime agreement, HP awards a user a service credit if its Series 44's downtime exceeds 1% for any three-month interval. The amount of the credit equals a user's monthly service charge, HP said.

The guaranteed-uptime agreement means that a Series 44 operating 24 hour/day, seven day/week will qualify for a service credit if its total downtime exceeds 22 hours during a typical quarter.

For HP, the agreement provides a strong financial incentive to keep a user's Series 44 up and running almost all the time," the spokesman said.

One of the keys to making the guaranteed-uptime agreement work is the Series 44's integrated Control and Maintenance Processor (CMP). single-board microcomputer with selftest and diagnostic capabilities.

When part of a Series 44 fails, users activate the CMP locally in an attempt to pinpoint the source of the problem. In many cases, the CMP's self-test and diagnostic procedures allow users to specify the exact nature of their system's trouble when they request help from their area HP service center.

If a user-initiated self-test fails to isolate a systems bug, the CMP can be activated remotely from an HP service center, which can rerun the user procedure and perform additional diagnos-

Slated to start Feb. 1, the guaranteeduptime agreement will be made available to all Series 44s lying within a 100-mile radius of any HP primary service office.

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FBI Agent Says Crime Pays: DP Theft Averages \$500,000

CW Washington Bureau WASHINGTON, D.C. — Who says crime doesn't pay? The take from an "average" computer-related crime is approximately \$500,000 and only about one of every 22,000 computer criminals goes to jail, according to one estimate.

"That sort of blows holes in this theory we tell our kids about crime not "Federal Bureau of Investigation (FBI) agent Paul Nolan noted at last week's Computer Crime Info.

Nolan, a supervisory special agent in the bureau's white-collar crime sec-tion, admitted the statistics on computer crime are not much more than best estimates, but said the magnitude of the problem is inescapable.

Nolan told the conference a "large computer company" - a manufacturer he would not identify - told the FBI recently "that they were aware during fiscal 1979 of 1,083 computer-related crimes." The average loss was \$502,000, he said. Only 12% of the crimes were reported to law enforcement authorities and only 18% of those reported crimes resulted in convictions, according to Nolan.

Robbery Report

In an interview following his conference address, Nolan said a recent FBI bank robbery report showed embezzlements without the aid of a computer averaged \$23,000 while computer-assisted embezzlements averaged \$430,000. Bank robberies, by way of an additional comparison, averaged only about \$3,000.

It is obvious, he said, that "computer people" have it all over the everyday pencil-pusher" embezzler and the lowly, garden-variety bank robber.

Nolan expressed confidence in the bank-loss estimates because they came from various federal regulatory agencies that oversee financial institutions a business sector that is heavily regulated and closely watched.

And of course no one expects the statistics to get any better any time soon, considering the massive proliferation of computers and the numbers of people exposed to them, he remarked.

The FBI, however, is much better prepared to investigate and assist in the prosecution of computer crime than it was just a few years ago, according to Nolan. He noted the Bureau recently lowered its mandatory retirement age, which necessitated bringing in many new agents.

Computer Backgrounds

Most of the new agents have had some exposure to computer science as part of their college curricula, he said And because the FBI recruits a lot of accountants, it is getting significantly more people who are already familian with computers

In addition, all agents receive at least some training in computer crime investigation, with some agents going on to advanced study in what the Bureau calls "system deceit crime."

One thing the FBI is looking forward to is congressional approval of the proposed Federal Computer Systems Protection Act now languishing on Capitol Hill. Nolan said the FBI will continue to push for the bill when the

new Congress comes in next year. The "would make it a hell of a lot " to prosecute, he said.

But, he added, "one thing that we've learned is that it's not enough to try to control computer crimes by playing catchup. It's ridiculous to let this type of crime take root in fertile soil and then try to frustrate it rather than to do something about its breeding ground.

Nolan told the conference attendees that companies should "improve their business ethics. We want them to stop the crime before it occurs," he said.

The FBI wants these crimes reported, Nolan said, "because we want to do what is expected of us to do - that is, lock people up.

Computers Linked to Blaze

HARRISON, N.Y. - An explosion and fire that killed at least 26 people here last Thursday morning was apparently caused by some computers that Arrow Electronics Corp. was demonstrating for some of its executives.

The tragedy occurred at a recently built Stouffers hotel and conference center here. The five-alarm blaze reportedly killed some of the Arrow executives, who were there for a budget meeting. Toxic chemicals within the building were blamed for the fire's spread.

The Arrow demonstration was laid out in three rooms and consisted of computers and other highpowered electrical equipment," according to reporters on the scene.

Arrow distributes memory mod-ules, matrix printers and disk drives, among other computer-related products. A spokesman for Arrow refused to comment on what equipment was involved.

The fire broke out in a one-story conference center next to the nearly full 365-room, four-story hotel. Most of the victims were business executives.

Smoke inhalation was blamed for most of the deaths, but some victims burned to death.

Hotel officials said the building's smoke detectors and sprinkler systems functioned normally during the flash fire, which broke out at 10:23 a.m.

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Honeywell Unwraps 10-Member DPS 6 Family

(Continued from Page 1)

- introduced about two months ago -they are geared for distributed processing environments.

Low-End Models

The first three low-end DPS models feature a fiveslot Megabus and 128K bytes to 256K bytes of memory. Each processor can support up to eight communications lines and a variety of mass storage ranging from a 10M-byte cartridge disk drive for the 6/30 to an 80M-byte cartridge disk with the 6/34.

On the other hand, the DPS 6/38, while still a low-end system, has a 10-slot Megabus and a maximum memory capacity of 768K bytes. This system can support up to 24 communications lines

In a typical configuration, the DPS 6/30 is priced at \$28,800, including a CPU with 128K bytes of memory,



Honeywell's first 32-bit computers are available in two models: the DPS 6/92 and the DPS 6/96 (pictured).

10M bytes of disk storage, a 160 char./sec printer and two CRT termi-

nals. A 6/38 similarly configured but with 256K bytes of memory and a 26M-byte disk costs \$44,500.

Mid-Range Systems

All of the medium-range systems in the DPS team except for the 6/48 feature a second Commercial Instruction Processor (CIP) that acts as a slave to the main processor, handling Cobolor RPG-generated programs. These systems can be supplemented by an optional Scientific Instruction Processor (SIP) for enhanced execution of Fortran or Basic programs, the spokesman pointed out.

The 6/48 can support up to 32 workstations and up to 1G byte of disk storage. It can also carry up to four printers, two card readers, four magnetic tape drives and/or two diskettes, the spokesman said.

The 6/54 and 6/74 can each support up to 40 communications lines and up to 1G byte of disk storage, while the 6/76 handles a maximum of 64 workstations and 2G bytes of disk storage. In addition, both the 6/74 and 6/76 incorporate a cache memory to speed

Each of the four medium-range DPS systems can be upgraded to 32-bit

computers basically by plugging extra boards into the processor. The ma-chines feature an expandable Megabus that consists of a 32-bit bus line sandwiched between two 16-bit communications avenues. When the user wants to upgrade, 32-bit devices are inserted into the Megabus and make contact with the 32-bit pipeline, the spokesman explained.
The upgradable DPS computers are

priced from \$50,000 to \$200,000 for typical systems.

'Flagship' Systems

Finally, the company's 32-bit comwhich were described as the flagships of Honeywell's extended momentum into distributed processing - offer a maximum of 64 communica-tions lines with the 20-slot DPS 6/92 up to 112 I/O lines with the 40-slot

The computers also respectively feature up to 2G bytes and up to 3G bytes

of mass storage. The 32-bit bus in both computers is a fully compatible superset of the 16-bit Megabus used in the Level 6. However, by doubling the width of the data path, throughput has also been doubled from about 7.5M to 13M byte/sec, the spokesman claimed.

Although the DPS 6/92 and 6/96 are fully software-compatible with the Level 6, in scientific and commercial applications the machines operate at about three times the speed of the Level 6 Model 57 - Honeywell's topof-the-line Level 6 computer said to be significantly beyond that of most other 32-bit systems.

The 6/92 has a direct addressing range of 4M bytes while the 6/96 has a 16M-byte range. Using Honeywell advanced Cobol, the systems clock a Cobol execution rate of more than 80,000 statements per second, the spokesman

The multiprocessor 6/92 with 1M byte of memory, two disk drives, a console and a 600 line/min printer costs \$223,400. The DPS 6/96 with 4M bytes of memory, four disk drives, two tape drives, a card reader and the printer sells for \$461,800.

The 16-bit models in the DPS family will be ready for shipment in the first quarter of 1981 and the 32-bit machines will be shipped in the fourth quarter of 1981

IBM Division Opens Second Retail Outlet

BALTIMORE - IBM's Office Products Division opened its second retail sales outlet here

Like IBM's first outlet, opened in mid-November in Philadelphia, the Baltimore store will focus mainly on IBM's line of typewriters and copiers. IBM's Displaywriter, a word processing unit, and the 5100, a desktop computer, will also be available.

The store will offer other computer paraphernalia such as printer ribbons and paper for certain hardware, a spokesman said.

IBM plans to open several stores in 1981, but a spokesman declined to say how many stores or where they would be located

However, the spokesman said the sucess of the Philadelphia and Baltimore stores would determine future policy.

Jerritts Says DPS 6 Won't Replace Level 6

BILLERICA, Mass. - Although Honeywell, Inc's new DPS 6 series computers offer more computing muscle than the firm's Level 6 minicomputers for nearly the same price, they will not replace the four-year-old computer line.

"One does not take away from the other. One reinforces the other," Stephen G. Jerritts, president of the company, said at last week's system

introduction.

However, "traditional minis are a thing of the past," he observed later

Speaking at a press conference held at Honeywell's Small Systems and Terminals Divisions here, Jerrits reassured the small audience of mostly press people that the firm would not abandon the approximately 10,000 Level 6 users worldwide. Systems enhancements and improvements would

However, Jerritts did say that the company's momentum would be toward distributed processing and the application of vertically aimed "Solution Systems

Honeywell's chief executive officer also stated that the firm at this time would not do anything to alienate users of the company's Series 60 Levels 62 and 64 mainframes. Such is not the case in Europe, where a DPS 4 series of computer was unveiled as a direct replacement for the Level 62. The DPS 4 computers are not available in the U.S.

Meanwhile, Honeywell has high hopes for its DPS 6 solution systems, which incorporate the Level 6 proces-

sor as a front end, and sees the computers making up nearly 50% of the company's annual revenue in five l'ermina

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Honeywell Offers WP Application, Office Software

By Tim Scannell

CW Staff
BILLERICA, Mass. - Honeywell, Inc. waded into the fast-moving office automation waters last week by intro-ducing a word processing (WP) software application and two software systems for large, multiterminal users.
The software-based systems were in-

troduced at the same time as the DPS 6 series processors, whose distributed processing capabilities they were de-

signed to enhance. The Word Processing 6 application package runs on both DPS 6 or Level 6 computers under the Mod 200 and Mod 400 executives of the Gcos 6 operating system.

In a nutshell, the package allows uers to interchange text and data processing files or incorporate information from different systems' files into a single re-

The files can be placed on the same system, on another system, or can be telecommunicated from a remote mainframe, a spokesman explained.

The package is menu-driven and can co-exist with transaction processing, data entry or other user-written pro-

Shared Resource Systems

The shared resource systems - the Adminstrative System 4 and Administrative System 16 - were designed for users in large organizations that need multiterminal word processing plus document distribution facilities.

Available on the DPS 6/30 and 6/32, Administrative System 4 supports up to four workstations, two printers, 10M or 26M bytes of fixed and remov-able disk, and diskettes for archiving purposes, the spokesman continued.

On the DPS 6/38 and 6/48, the System 16 handles up to 16 workstations, six printers and all of the storage devices offered by these systems, the spokesman added.

The shared resource software utilizes the firm's transfer facility for telecommunicating documents from one location to the next, and is menu-driven and menu-defined to help users define different locations on a network. Users can send or receive electronic mail via a mailbox system, selecting which correspondence they want to review by scanning a list.

WP Capabilities

Word processing capabilities of both the shared resource and word processing systems include text entry, abbreviation, text formatting, text revision, global search and replace, pagination and column manipulation.

Hardware for both software-based systems includes the firm's VIP 7803 visual display terminal with detachable keyboard and a letter-quality printer, the spokesman noted

The Word Processing 6 facility is priced at \$5,000 with an annual soft-ware support charge of \$1,350. The Administrative System 4 and 16 cost \$3,000 and \$5,500, respectively, with annual software support charges tagged at \$810 and \$1,485, respec-

Both office automation systems will be available in first-quarter 1981.

And the Glue: Updated Gcos 6

BILLERICA, Mass. — Covering every angle, Honeywell, Inc. last week introduced the glue to hold together its new DPS 6 distributed processing-oriented computer line: an updated release of its Gcos 6

Mod 400 operating system. Gcos Mod 400 Release 2.1 increases communications support in distributed environment, improves access to the system and provides a multikey route to get at the computer's files, Honeywell claimed.

Enhancements include a power resumption feature that uses the memory save and battery backup to preserve the memory image through power failures; a file recovery feature that saves recorded images before they are updated and writes these images back to the file later to ensure file integrity in the event of a power or program failure; and a checkpoint restart facility to help with file recovery, a Honeywell spokesman explained.

Alternate Index

The updated operating system also has an alternate index or multikey feature that helps the programmer locate files and file information from a different perspective, as well as a record locking facility that pre-vents unauthorized access to shared data in a distributed arrangement, the spokesman added.

Focusing on memory utilization improvements, Honeywell added buffer pooling to the operating system, which provides a method of conserving memory for disk file ac-

When users open a file, that file is assigned to a buffer pool, which can be designated public or private

Private pools exist in user memory and are only usable by the person who created the pool, a spokesman

Mod 400 Release 2.1 will be available in January at an initial license feel of \$4,500. The annual support charge for the operating system will



Lame Duck Congress Hatches Paperwork Bill

By Jake Kirchner

CW Washington Bureau WASHINGTON, D.C. — Legislation to streamline federal information policies and practices, including acquisition and use of computer systems, was approved last week as the 96th Congress cleared its calendar for final

The Paperwork Reduction Act of 1980 was sent to President Carter after the House acceded to Senate amendments to exempt from the bill's provisions certain intelligence, defense and investigatory agencies.

The legislation had been approved by

The bill, H.R. 6410, was originally approved by the House in March but had been held up in the Senate primarily because of Defense Department concerns that the legislation would further complicate the acquisition process for defense DP and telecommuni-

The bill has two main objectives: to reduce the federal paperwork burden on the public and to improve the management of federal information re-

The legislation incorporates recom-mendations of Carter's federal ADP reorganization project and of the Commission on Federal Paperwork. Rep. Frank Horton (R-N.Y.), chairman of the paperwork commission, cospon-sored H.R. 6410 with House Government Operations Committee Chairman Jack Brooks (D -Texas).

Billion-Dollar Savings

Proponents of the legislation estimate it will save the public as much as \$1 billion a year by reducing require-ments to provide information to federal agencies. To that end, the bill calls on the Office of Management and Budget (OMB) to implement a govern-mentwide, on-line "federal information locator system" to promote agency information sharing [CW, March 3].

Among provisions to streamline federal DP practices, the bill calls for establishment of a high-level Office of Information and Regulatory Affairs in OMB to be responsible for all government information practices, including 'acquisition and use of automatic data processing, telecommunications and other technology for managing information resources.

Anticipating passage of the legis-lation, OMB has already reorganized along the lines called for in this provision. In addition, each federal agency is directed to designate a "senior official," reporting directly to the agency head, who will be responsible for the agency's activities legislation's mandate. activities under

Those activities include a requirement that every agency "systemati-cally inventory its major information systems and periodically review its in-formation management activities, including planning, budgeting, organiz-ing, directing, training, promoting, controlling and other managerial activities involving the collection, use and dissemination of information.

Five-Year Plan

H.R. 6410 requires agencies to develop a five-year plan for meeting their "information technology re-source requirements." OMB, assisted by the General Services Administration, is charged with developing a governmentwide plan that will assure, according to Rep. Brooks, "the most recent technologies are known and are made available to meet the agencies' requirements.

Brooks said the legislation is needed because "the government's traditional information systems are breaking down under the burden" of increased processing demands.

'Instead of providing timely and accurate information to manage government programs and services," these systems more often than not stifle communications between the government and the people, mislead the government decisionmakers, clog information channels and suffocate government officials under mounds of computer printouts."
The Paperwork Reduction Act will

go into effect April 1.

IBM Watcher Sees Changes Ahead for H

(Continued from Page 1) enhanced by stretching the 3081's 32K-byte buffer storage to 64K bytes

– a change that could be accomplished by some board switching in the field.

Claiming that the 3081 is the "tip of the iceberg," Fertig said the Nov. 12 announcement marked a change in IBM's marketing strategy.

The firm now plans to announce de-graded, or "crippled," CPUs and gradually enhance them to offer more power, according to the IBM watcher. who said the strategy will give each CPU model a band of performance versions that will make life more difficult for manufacturers of plugcompatible mainframes.

Operating System

Fertig also believed IBM will make some hefty changes to the MVS/SP operating system. Those changes will allow other operating systems, such as OS/VS1 and DOS/VSE, to run as subsets of MVS without increased overhead.

This would give a clear, easy migration path to IBM's biggest operating system, and IBM would get more

money, according to Fertig.

The new version of MVS — which Fertig dubbed MVS/E — will offer virtual machine capabilities, 32-bit addressing and an immediate interface to OS/VS1. An interface to DOS/VS will come along later, he predicted.

The key to MVS/E is a new facility called the System Repository and Directory (see chart). This facility will act as a software controller and watchdog, Fertig said, serving as a go-between for MVS/E and other subsystems such as JES, IMS, TSO and a data dictionary.

However, it will also protect MVS/E, beefing up the operating system's integrity and security, Fertig said.

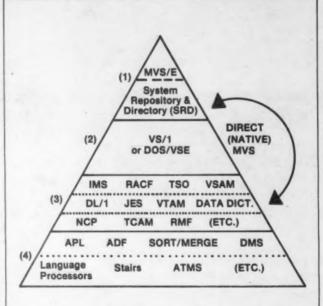
Speaking of the 3081 processor it self, Fertig pointed out that IBM announced the 3081 with a 26-nsec cycle time and a performance rating of 10.5 million instructions per second (Mips). The 3033 has twice the cycle time - 57 nsec - and roughly half the performance, around 5 Mips.

However, the 3081 is a dyadic processor, which works similar to an attached processor. If the 3081 were viewed as a uniprocessor (although IBM has said the dyadic processor can not be split in half), it would offer roughly the same performance as the 3033

TCM a Mistake

Another area in which Fertig claimed IBM has fallen behind is cooling. The recently announced Thermal Conduction Module (TCM), which contains approximately as many logic chips as a 370/145 in a 61-cubic-inch heliumfilled container, is a technological advance, but is a mistake on IBM's part, Fertig maintained.

The TCM was originally designed to



IBM SOFTWARE LAYERS

(1) MVS/Extended with virtual machine capability and 32-bit addressing:

OS/VS1 interface under MVS/E (now); DOS/VS interface under MVS/E (later)

- SRD controls all access to resources and maintains inte-
- grity/security.
 Subsystems: Program products for data communications/ (3)

Productivity Tools.
Application Code: Customer developed code.

Chart Courteey Advanced Computer Techniques Co.

MVS/E: ACT's Prediction

a self-contained cooling unit. But IBM discovered - well into the 3081 testing phase - the TCM was not sufficient. It then reinstituted the concept of running chilled water - from outside the CPU - through the TCM.

While Fertig admitted 3033 users the most likely candidates for the 3081 - already have the necessary plumbing to use water cooling, he said it was a big disappointment for IBM that the self-contained TCM did not work out.

Fertig was quick to point out, however, that the 3081 offers some advantages, too. For IBM users, it gives more Mips for the dollar, while promising that performance will get even better when some hidden features are brought to light.

And despite Fertig's contention that the TCM is at least partly a mistake, he said it is still a technological improvement - another feather in IBM's cap.

The 3081 also has improved I/O capabilities (all 24 channels can be used for high-speed multiplexing) and re-

quires less space, power and cooling than the 3033. It is 370 softwarecompatible, and the speculation that IBM will soon announce a 3081 native mode is an indication to 3033 users that they will not be left out in the

cold, according to Fertig.

Another advantage to the 3081 is improved reliability, accessibility and serviceability (RAS) and lower maintenance costs, the ACT vice-president said. Advanced processor technology along with power and the thermal monitoring, checkout and retry and field-replaceable unit technology in the processor controller make it more advanced than the 3033, he added.

IBM's dial-up service facility for MVS also will cut maintenance costs on the 3081, Fertig said, but he noted that recent increases in service charges on the 3033 line offset the recent price cuts on those systems.

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Managers Told Value, Not Cost, Sells Systems

By John Whitmarsh CW Staff

LONDON - How do you justify your computing system to top management - cost or value?

DP managers who point to the multimillion dollar cost of computers as the justification for their existence are only fooling themselves, according to David Butler, chairman of Butler Cox & Partners Ltd., a British DP research and con-

sulting firm.

The cost of computing systems is not the best way to in-

gathering of international

computing experts, drawing over 400 delegates from 18

CW at Infotech

DP," Butler told attendees at the opening session here last week of the Infotech State of the Art Review

Infotech is Europe's largest

countries to hear 74 speakers discuss key developments in computing around the world.

"Despite the fact that computer systems are becoming more expensive, I doubt that

the cost of those systems is the reason why they loom so large in the eyes of top manage-ment," Butler said.

On a strictly cost basis, DP expenditures across all industries average around 2% of total corporate expenditures - a cost that in some companies compares to the amount spent on office cleaning services, ac-

cording to Butler.
"The true importance of computing systems is not what they cost, but what they earn," Butler emphasized. emphasized. The fact that it is easy to measure cost and difficult to measure benefit does not change matters. It is in the light of what systems can do for companies that DP is evaluated."

How to make computing systems more valuable to the companies they serve and thus more competitive for top management's attention and recognition?

Several key issues need to be addressed, according to But-

· Office automation. "Office automation is the most burning issue now," Butler said, adding that implementation of these systems is the big challenge of the next 10 years.

The need for office automation is paramount and selfevident in an era of spectacu-larly low office productivity and high labor costs," Butler said

Implementation can proceed along one of two routes, dayto-day experimentation long-range planning. search conducted at 30 British companies by Butler Cox found that experimentation with office automation systems was by far the preferred method.

"We have found very few companies that are putting down long-range detailed plans," Butler reported. "Experimentation seems to be the way ahead because, unlike DP, it does not cost an arm and a

Implementation of office automation systems - whether by experimentation or deliberate planning - is not expected to have serious impact on those 30 companies until 1983 at the earliest, Butler added.

• End-user computing. "Computers get cheaper, packages more widespread and vendors more intent on cultivating the end user directly," Butler said. "And the appearance of more microcomputers and high-level languages makes it easier for the end user to use computing systems.

This specter of user power is generating heated arguments and throwing DP managers into a state of anxiety. An uncontrolled slide from centralized human and processing resources into a totally decentralized system is the danger, according to Butler.

"A concerted campaign of internal education to alert management to the risks of uncontrolled development" is one half of the solution, according to Butler. The other half is end-user education that lays the foundation for sensiend-user computing schemes

· Systems development pro-(Continued on Page 12)



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No Longer a Dream

Frank Predicts Integrated Digital-Based Nets

CW Staff LONDON — The integrated network of the future - that which supports voice, data, facsimile and video modes in a single exchange - will almost certainly be digital-based.

What's more, digital technology is advancing at such a rapid clip and costs are dropping so fast that such integrated networks are no longer the dream of futurists. They are technically feasible and within the financial grasp of large organizations right now, according to Howard Frank, president of Network Analysis Corp., of Great Neck, N.Y.

Because of the radical reduction in cost of digital logic, it is now relatively inexpensive to convert voice and facsimile to digital signals and to perform sophisticated digital switching," Frank said here at the Infotech State of the Art Review, Europe's largest con-fabulation of international computing experts.

This factor, combined with the properties that digital transmission has more resistance to noise than analog transmission and that switching, compression, encryption and other 'added value' services can be more easily implemented digitally, results in a strong motivation for combining all modes of communication onto digital channels."

Significant advantages can accrue to reorganizations that integrate their voice, message, data and facsimile requirements, according to Frank. Among those advantages:

Voice circuits not used after business hours will be

available for data, message and facsimile traffic during off-hours.

By combining separate requirements for voice, message and data, the total number of circuits can be reduced with-

out degrading service quality.
• Individual requirements of voice, data and message at a given site might not justify a leased circuit, but the combined requirements very well could, thus introducing economies of scale.

The heart of future digital networks will be sophisticated digital switches now under development that will be able to switch voice, data, message and facsimile traffic in any combination. By 1985, most suppliers of conventional private telephone branch ex-

dicted. Initially these switching nodes will be based on changes (PBX) will be offering circuit-switching technology

CW at Infotech

PBX devices incorporating these switches, Frank said.

Specific characteristics of future networks containing these switches are not yet defined, Frank cautioned.

Digital Backbone

"The future integrated network will have a primary digital backbone connecting a set of either public or private but will be replaced later by hybrid switches combining the best elements of circuitswitching and packetswitching technologies.

Ultimately the switches may become pure packet switches serving both voice and data. However, such switches will be used only in special cases until the latter half of the decade, Frank added.

ade, it is feasible that satellites

will be able to serve most of

the medium and large loca-

tions of a large organization.

However, unless major break-

throughs in transmission tech-

nology are forthcoming, there

may not be sufficient capacity

available within currently fea-

sible frequency bands to serve the array of desirable ser-

vices.

The switching nodes them-selves will be linked together via common-carrier digital lines, either terrestrial or satellite. If satellite, there may be additional transmission facilities from the site of the switch to the satellite ground station.

Trunk Lines

Local-access trunk lines emanating from computerized PBXs on customer premises will connect with the switching nodes in Frank's scheme. For the forseeable future many trunks will remain analog if routed on terrestrial facilities. Eventually, however, some of the links between the PBX and switch might become radio channels, "but this migration will depend on the cost of radios, ground stations and the tariffs for terrestrial circuits," Frank said.

"It is highly likely that as hardware communications continues its cost decline with respect to the cost of transmission, more and more local access will be accomplished via techniques," noted

Technological innovation in the '70s focused on the "longhaul backbone networks," but (Continued on Page 12)

Frank's Forecast

LONDON - If integrated networks are in the future for data communications users, so are new value-added services, lower cost satellite services and incompatibility problems with the X.25 standard. Here is a forecast of what is ahead in those three areas by Howard Frank:

. X.25 Standard. "While the X.25 standard has been widely adopted for packet-switching systems, this standard addresses only the first three levels of the Ansi/ISO Protocol Reference Model. Furthermore, there are today many incompatible implementations of X.25. Thus, while standards emerged during the last dec-ade, much work is needed before one even remotely resembling a universal standard is possible. "It is highly likely that over the next few years all major vendors will provide some form of X.25 interface. It is equally likely that in 1990 litcompatibility will have been achieved at the upper levels of the protocol fami-

· Value-Added Networks and New Carrier Services. Today's value-added networks (VAN) have increased rapidly in number of access locations and within the next decade should provide convenient access for a majority of the population of Western Europe and North America.

"Currently, most data service is for low-speed (up to 1,200 bit/sec) asynchronous terminals. However, synchronous service on a limited basis is now available and, within the next few years, should be widespread. However, today's VAN represents only a minimum resource compared to the data communications utility required by tomorrow's

"The next step in the evolution is the attachment to the VAN of additional valueadded services such as message and mail services. By 1990, numerous new elecincluding tronic services store-and-forward voice will be available. This latter feature will probably be introduced into the VAN services during the 1983 to 1985 period.

· Satellites. "The cost of high data-rate satellite channels is substantially lower than their terrestrial equivalents. As higher frequency satellites develop, smaller and cheaper ground stations will become feasible and, consequently, a greater number of such stations will be economically feasible.

"Thus, within the next dec-

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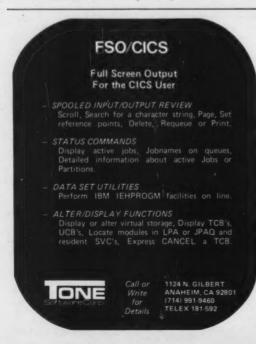
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Vendor Size, Base Seen Vital To Future Survival in Industry

Special to CW LONDON — The vendor company most likely to survive in the future information industry will be large, offer a broad spectrum of products and be headquartered in a country that will support its development.

A New York-based industry consultant, Philip Dorn, told the recent Infotech State of the Art Review in London that only IBM comes close to the survival model he envisaged. There are, however, other companies not yet rec-ognized as "computer industry" companies that could meet the criteria. He cited both Exxon and Xerox Corp. as examples.

Dorn divided the well-known names of the industry into four categories ranging

W at

to "Some Changes Needed."
As expected, IBM and many of the emerging Japanese com panies, including Fujitsu, Ltd. and Hitachi, Ltd., fall into the first category along with CII-Honeywell-Bull and Siemens.

Dorn's "Pretty Good Bets" included Amdahl Corp., Control Data Corp. and Philips. Up and coming companies, which Dorn saw as having too sufficient research resources, included Tandem Computers, Prime Computer, Inc., and Wang Laboratories, Inc.

What might be called the danger zone - where Dorn saw a need for change - in-cluded most of the non-IBM compatible manufacturers still in the mainframe business: ICL, Honeywell, Inc., Burroughs Corp., NCR Corp. and a couple of surprises in Digital Equipment Corp. and Intel.

Despite IBM's poll position, however, Dorn said "the notion that an IBM can dominate this new information technology industry the way that they once dominated data pro-cessing is foolish." Rather, he predicted the industry will be dominated by a small group of competing companies.

Direct competition will ensue between vertically integrated companies that are hardware manufacturers and software suppliers and information gatherers and pro-viders of network services that connect it all into place. Entry into this business may come from any of several sources; computing, communications or pure outside."

Manchester is a staff writer at Computerworld UK.

Prof's Predictions Called 'Preposterous'

LONDON - "Preposterous

'Pie in the sky. 'Superfluous

Those were hardly the adjectives Anthony I. Wasserman would have chosen, but they summed up the reaction of skeptical attendees at the recent Infotech State of the Art Review here to Wasserman's vision of the next generation of software development tools.

Wasserman, an associate professor of medical information science at the University of California at San Francisco, had just finished a chronology of the working environment of the professional programmer since 1960 when he launched into his answer for the software development

"By the mid- to late '80s, I expect a new mode to evolve based upon personal computing that will address the problems of current software tools and development environments and the basic needs of the programmer," Was-

"In particular, I envision personal computers integrated into video terminals that will provide sizable processing and storage capacity. They will look like intelligent terminals with the power of a 32-bit minicomputer. They will have graphics capability and audio input/output. They will communicate with each other in a local or geographi-cally dispersed network and will be supported by significant new software to create a working environment for programmers that can be tailored to individual needs.

nns personalized development machine — a "professional programmer-based system" (PPBS) — could be built now for \$50,000, Wasserman said. By the end of the '80s it would cost \$10,000 to \$20,000 would cost \$10,000 to \$20,000 or roughly the same amount now spent to train a single programmer for one

year on a time-sharing system.

Wasserman admitted his concept was "highly speculative" and said prototypes are currently being designed but they need further study."

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Managers Told Value Sells Systems

(Continued from Page 10) ductivity. "The problem is a long way from being solved," according to Butler. The program is aggravated by a "monstrous" backlog of work that will grow over the next five years and by manpower shortages that in England will require at least 500 new programmers per month through 1985 to keep pace with growth in user demand.

In addition, a Butler Cox sur-

vey found that more than half systems development work that is ever done on an average project is done after it

Thus, cutting the costs and duration of systems development is false economy in Butler's mind because it pushes problems into the future where over 50% of the development work still awaits.

Productivity aids, usually thought to be advantageous,

may in fact be detrimental to systems development.

Report generators, management systems, high-level languages and so on, which generally aim at faster or cheaper implementation, are not just irrelevant to the main problem but could actually make it worse by speeding up and cheapening delivery of these products that consume more raw material to run than to make," Butler said.

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Integrated Nets Sighted

(Continued from Page 11) future efforts will center on the local access area, Frank stated

The future PBX will be the interface between growing in-trafacility networks and the outside world," Frank said. In addition to its most advanced current features and elements, it will contain banks of voice digitizers and dynamic multiplexers and will also be able to interface directly to remote PBXs, packet switches and a variety of other network controllers," Frank envisioned.

The integrated network of the future is technically feasible now, Frank said, adding that many of its necessary components exist as off-the-shelf devices. The cost of those devices will drop over the next five years to the point where large corporations can begin cost-effective implementation.

"Since the need to transmit combinations of voice, data, message and facsimile traffic is characteristic of the modern organization, strategic planning for these networks will become a major area of attention within the next few years," Frank said.

This evolution is sure to place demands on the way an organization manages and controls its networks. Voice and data communications are typically maintained by separate departments in today's organization, with the latter being part of the DP shop. That may change, according to Frank.

Antitrust Case Reinstated on Appeal

IBM Loses in Bid to Kill Symbolic Control Suit

By Jeffry Beeler CW West Coast Bures

SAN FRANCISCO — IBM has been temporarily thwarted in its bid to prevent or at least delay resumption of the Symbolic Control, Inc. vs. IBM antritrust suit, which was at first dismissed and later reinstated on appeal.

The Ninth U.S. Circuit Court of Appeals has denied IBM's request for a review of a lower court decision reversing the original dismissal.

The circuit court's Nov. 19 ruling paves the way for the resumption of the Symbolic Control vs. IBM trial, in which the industry giant stands accused of seeking to monopolize the software business through predatory pricing.

IBM still has the option, however, of appealing the rehearing decision to the U.S. Supreme Court. If the company exercises that option, the resumption of the Symbolic Control vs. IBM trial could be postponed indefinitely, or even circumvented entirely.

Few Precedents

The circuit court's refusal to grant IBM a rehearing reportedly marks only the second time that the industry giant has lost two decisions at the appellate-court level during the same antitrust trial. The only precedent for such a setback occurred during the suit filed by Greyhound Computer Corp., according to Symbolic Control's president, Art Pfeiffer.

Never before has a plaintiff enjoyed so much success against IBM in an antitrust suit where the main focus of discussion was software, Pfeiffer

Filed in Nov. 1971, Symbolic Control's suit accuses IBM of giving

Slots Filling Up For Comnet 1981

HOUSTON — Telecommunications' leading users, technologists and consultants are filling up the program slots for Communication Networks (Comnet 1981), which will be held here Jan. 12-15.

The 70-session program covers new technology, products, carrier services, applications and key economic and policy considerations for voice, data and electronic mail communications.

Heading the list of speakers are Allen Krowe, president of IBM's Systems Communication Division, who will provide some guideposts on what is ahead for the data user, and Dr. C. Jackson Grayson Jr., president of the American Productivity Center, who will address the role that telecommunications will play in improving corporate resource usage.

Participants from Comnet 1980 returning this year include Dr. Dixon Doll of DMW Group; Dr. Howard Frank of Network Analysis Corp. and Richard L. Deal of R.L. Deal Associ-

Admission fees range from \$395 for the full three-day event to \$5 for exposition entrance only. Further details are available from show sponsors at Communications Networks '81, The Conference Co., 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701.

away its software in an effort to promote its hardware sales. IBM's software-giveaway policy allegedly gave the company an unfair advantage over its competitors, none of whom could afford to adopt a similar practice, and prevented Symbolic Control from selling its main product, a software package for numerical-control machine tools, the complaint contended.

As a result of IBM's allegedly illegal pricing practices, Pfeiffer's Palo Alto, Calif.-based firm was eventually driven out of business, the suit claimed. The company nine years ago filed the law suit charging IBM with antitrust-law violations and seeking

damage totaling \$63 million, which would automatically be trebled to \$189 million.

Bifurcated Case

Symbolic Control's case first appeared in Federal District Court here, where the trial was bifurcated to allow its two main issues to be tried separately. The first issue to be examined was impact, which refers to the injuries allegedly inflicted upon Symbolic Control by IBM's pricing practices. The second issue was violation, which refers to the alleged illegality of the practices themselves.

After considering arguments on both sides, a district court judge dismissed

Symbolic Control's case against IBM. But the plaintiff appealed the dismissal and finally convinced a federal appelate court here to reverse the original decision.

Symbolic Control's suit was reinstated for two main reasons. First, the appellate court judge ruled that the earlier decision had ignored some of the antitrust case's key issues, including the effect of IBM's pricing actions on the plaintiff's financial condition.

Second, the appellate court ruled that the bifurcation of the original trial was improper and that the decision to try the issue of impact without first defining the accompanying violations was illogical and unjustifiable.

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Datapro Finds Europeans Highly Recommend

CW Staff
DELRAN, N.J. — Mirroring the satisfaction expressed by European mainframe users, small business computer users in Europe told Datapro Research Corp. they like their systems, like their vendors and would recommend both to other users.

In general, more than three-quarters of small business computer users surveyed in France, West Germany and the UK indicated that satisfaction, Datapro reported in its recent "European User Ratings of Computer Systems'

Rating their small business systems on a scale ranging from 1 (poor) to 4 (excellent), users in France awarded their computer systems a high overall score of 3.0 in terms of user satisfaction, while British users followed with an overall 2.9 rating and German users gave vendors' equipment a 2.8 overall satisfaction rating.

In an effort to determine how well small business computer vendors in the three European countries are meeting user needs, Datapro surveyed more than 3,485 users, which rated 5,000 large and small installed systems. The survey found that small business computer users were happy overall with their system performance, regardless of vendor. The positive results found among the small computer business users were similar to those found among mainframe users in the same Datapro study [CW, Dec. 1].

'Rating their small business systems on a scale ranging from 1 (poor) to 4 (excellent), users in France awarded their computer systems a high overall score of 3.0 in terms of user satisfaction, while British users followed with an overall 2.9 rating and German users gave vendors' systems a 2.8 overall satisfaction rating.

Understandably, those users with older small business systems tended to report less satisfaction, but percentage point differences were very small, with no one vendor outperforming any other, the survey showed.

In France, small business users rated MAI (Basic Four Corp.) highest among vendors with a 3.6, followed by

Prime Computer, Inc. (3.3). German users rated Wang Laboratories, Inc. the top vendor (3.4) and awarded Computer Gesellschaft Konstanz the second highest spot (3.3).

Tied Rating

In the UK, Computer Automation, Inc. and Harris Corp. tied for first place with 3.3 each; the next highest rated vendor was Hewlett-Packard Co. with a 3.2.

Users were given the opportunity to rate their systems on 14 specific system functions. The results showed that users were least happy with technical support supplied by the vendor, while mainframe reliability was cited most often for high performance.

The Datapro survey examined a total of 191 minicomputers and small business computers comprising both foreign and U.S. manufacturers. A glance at U.S. vendors on the list shows that European users rely heavily on American small business computer equip-

In ratings for U.S. systems, users appeared only mildly pleased with Burroughs Corp. Only 33% of the German users would recommend Burroughs equipment to other users. Among British users, 75% would not recommend the B80 model they rated. However, satisfaction levels rose in France, where users indicated that 86% would recommend their Burroughs equip-

ment to other users.

Digital Equipment Corp. received 100% user recommendations on several of its small computers, and its PDP-11/34 and 11/40 received high ratings from users in France and Germany for mainframe reliability.

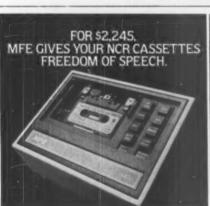
The Hewlett-Packard Co. 250 computer received a perfect score for its ease of operation and ease of programming by German users. The same user group rated the 250 high in mainframe reliability and applications program-ming, gave it an overall satisfaction rating of 3.7 and a 100% recommenda-

tion rating.
British users gave HP 100, 3000 Series III and 3000 Series 33 all 100% recommendations and also cited them for their operation ease, mainframe relia-

bility and operating system. The HP 3000 Series III and the 3000 Series 33 also scored high marks in France for its mainframe reliability and operating system, and 100% of French users of both systems would recommend it to others, according to the survey results.

IBM Scores

IBM offered users in the three countries one of the largest equipment selections of any of the U.S. vendors. In Germany, its Series/1 and Series/32 received 100% recommendations from its user base and, in the UK, Series/1 received a 100% recommendation. Although French users did not give any



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WEST GERMANY

	Overall Satisfaction	Would Rec To Ott	
		Yes (%)	No (%)
Burroughs Corp.	2.3	33	67
CII Honeywell Bull	2.5	77	23
Computer Geselichaft Konstanz (CGK)	3.3	75	25
CTM	3.2	100	0
Data General Corp.	3.0	67	33
Datapoint Corp.	_	67	33
Dietz	2.4	43	57
Digital Equipment Corp.	2.9	71	24
Hewlett-Packard Co.	2.9	80	10
IBM	3.0	77	22
ICL	2.7	76	19
Krenzle	2.5	55	27
MAI (Basic Four Corp.)	3.2	91	9
NCR	2.4	74	21
Nixdorf Computer Corp.	2.8	78	20
Philips Business Systems, Inc.	2.6	77	23
Prime Computer, Inc.	3.2	100	0
Siemens AG	2.1	- 44	56
Tandem Computers Inc.	_	100	0
Univac	1.8	25	75
Wang Laboratories, Inc.	3.4	100	0
Other Vendors	2.9	60	30

Figures are weighted averages based on a scale of 1 (poor) to 4 (excellent).

Their Small Business Computers and Vendors

IBM systems a 100% recommendation, users rated the Series/3 Model 8, Model 10, Model 15, Series/32, Series/34 and 1130 highly in mainframe reliability and ease of programming.

The IBM 1130, in particular, received a perfect score from French users for its mainframe reliability and high marks for its maintenance effectiveness and documentation — one of the few systems to score well in those categories. The mainframe reliability of IBM's Model 15 was rated highly by users in all three countries.

Prime also scored well in all three countries. In Germany, "all models" were given a 100% recommendation and maintenance responsiveness was given high marks. In France, Prime's 400, 500, 550, 650 and 750 systems were all given 100% recommendations and high marks for programming ease, operation ease, operating system and mainframe reliability; and the 550, 650 and 750 systems garnered a high rating for overall satisfaction.

In the UK, the vendor's 300 and 400 systems were given 100% recommendations. The 300 was cited for operation ease and its operating system and the 550 was cited for mainframe reliability.

Wang received a 100% recommendation from users in Germany for its

2200VP and its 2200MVP and high grades for its mainframe reliability by users in all three countries.

MAI (Basic Four Corp.) equipment, which was rated only by German and French users, did well in both countries. German users ranked MAI's

'The Datapro survey examined a total of 191 minicomputers and small business computers comprising both foreign and U.S. manufacturers. A glance at the list of U.S. vendors shows that European users rely heavily on American small business computer equipment.'

Model 400, 600 and 700 high on several system functions and gave each of the systems a 100% recommendation to other users.

Data General Corp.'s Nova 3 mainframe reliability was highly regarded in France, where its CS Series received high marks for mainframe reliability and ease of programming. German users also rated DG's ease of operation high.

The only country to rank the U.S. vendor Univac was Germany, where users appeared unhappy with the

equipment; 75% of the user population indicated they would not recommend Univac equipment to other users.

Among the major U.S. vendors marketing in the UK, users gave Computer Automation, Inc.'s Syfa system a perfect score in ease of operation and also gave high marks for its programming ease. Datapoint Corp. earned good grades for its operation ease and Harris Corp. received high marks for its operating system and compilers and assemblers.

All of the above systems, plus Perkin-Elmer Corp. equipment, Diablo Systems, Inc.'s Ranger 3200 system and Honeywell, Inc's. Level 6, were recommended to other users by their entire user population, according to those surveyed.

Tandem Computers, Inc.'s T16 did well in Germany in terms of ease of operation, compilers and assemblers and programming ease and also earned 100% recommendations from its German user base.

The survey, "European User Ratings of Computer Systems," covers micro-computers and personal computers, in addition to mainframes and minicomputers.

It is available for \$25 from Datapro, 1805 Underwood Blvd., Delran, N.J. 08075

THE RESERVE

	Overall Satisfaction	Would Reco To Oth Yes(%)	
Burroughs Corp.	2.4	55	45
Cli-Honeywell Bull	2.8	62	25
CMC	2.9	88	13
Data General Corp.	3.0	80	10
Datapoint Corp.	2.6	60	40
Digital Equipment Corp.	3.1	89	7
Hewlett-Packard Co.	3.1	84	11
IBM	3.1	81	15
ICL	2.7	74	24
Intertechnique (Microdata)	2.9	69	25
Logabax	2.8	100	0
MAI (Basic Four Corp.)	3.6	88	0
Mohawk Data Sciences Corp.	2.5	70	20
NCR Corp.	2.8	78	15
Nixdorf Computer Corp.	2.6	67	33
Norsk Data	3.0	100	0
Olivetti Corp.	2.9	63	38
Philips Business Systems, Inc.	3.1	82	9
Prime Computer, Inc.	3.3	96	4
R2E	2.3	80	20
SEMS	2.5	43	55
Texas Instruments, Inc.	3.1	83	8
Univac	2.7	83	17
Wang Laboratories	2.8	70	20

Figures are weighted averages based on a scale of 1 (poor) to 4 (excellent).

UNITED KINGDOM

	Overall Satisfaction	Would Recommen To Others Yes (%) No (
Allied Business Systems	2.8	71	29				
Burroughs Corp.	2.1	37	59				
BCL	2.9	86	14				
Computer Automation, Inc.	3.3	100	0				
CMC (Microdata)	2.9	87	13				
CTL	2.9	69	25				
Data General Corp.	2.8	73	27				
Datapoint Corp. (Ventek)	2.9	82	18				
Datasaab	2.7	75	25				
Diablo Systems, nc. (Xerox)	3.0	100	0				
Digico	2.4	43	57				
Digital Equipment Corp.	3.1	88	11				
General Automation, Inc.	2.4	56	44				
GEC	2.9	67	25				
Harris Corp.	3.3	100	0				
Hewlett-Packard Co.	3.2	95	0				
Honeywell, Inc.	2.8	78	22				
BM	3.1	85	15				
ICL	2.9 89	2.9 89	11				
Mael Computers	2.0	0	100				
Mohawk Data Sciences Corp.	2.3	67	33				
NCR Corp.	2.7	62	27				
Nixdorf Computer Corp.	2.8	60	40				
Olivetti Corp.	2.6	57	43				
Perkin-Elmer Corp.	3.0	100	0				
Philips Business Systems, Inc.	2.9	71	29				
Prime Computer, Inc.	2.9	89	11				
Redifon Computers, Ltd.	3.1	80	13				
Research Machines	3.0	88	13				
Systime	2.9	75	25				
Texas Instruments, Inc.	3.0	82	18				
Univac	2.7	71	14				
Wang Laboratories, inc.	3.0	75	25				
Other Vendors	2.5	75	25				

Figures are weighted averages based on a scale of 1 (poor) to 4 (excellent).

Nasa Monitor Helps Cut Energy Consumption

HAMPTON, Va. - When President Carter mandated a 5% reduction in energy usage, agencies everywhere scram-bled to find ways to cut back. However, the general atmosphere of confusion did not extend to the National Aeronautics and Space Administration's (Nasa) Langley Research Center here - the cen-ter had been reducing energy consumption on a continuous basis since 1977.

In fact, Nasa had set itself an overall goal to reduce energy usage 50% from fiscal 1973 to is scheduled for completion fiscal 1985.

The Langley Research Center deals primarily with aeronautical research. In fact, center personnel boast that there is not a major airplane manufactured and flown in the U.S. today without some parts designed or tested at Langley. The center consists of 90

major facilities, including laboratories, administration buildings and 10 major wind administration tunnels. Another tunnel, the National Transonic Facility,

next year.

The center is divided into seven directorates (adminiselectronics, engitration. space, structures, projects and aeronautics) and employs more than 3,000 people and 1,000 contractors.

One of Langley's most active programs concerns its energy usage, according to E. Eugene Mason, the center's energy resource manager. Langley's power bill for the fiscal year ending in September 1979 was almost \$5.5 million, or the equivalent of between 6,000 and 8,000 totally electric homes.

"Nasa knew it had to try to get a handle on how much electrical power was used and where. The only meters we had were in the major wind tunnels themselves, so we really didn't know what the rest of the facilities were using," Mason admitted.

Top Challenge

The challenge, according to Mason, was to determine where power was being used and where it could be reduced without adversely affecting the center's research role.

The problem was com-pounded by Langley's growth pattern, which had resulted in buildings being serviced by more than one power substa tion. One building alone had 13 meters that had to be read, added to and/or subtracted from in order to arrive at power usage

After a detailed feasibility Nasa installed study. computer-based monitoring system in 1977. The system, built around two Wang Laboratories, Inc. 2200VP units, is "management" tool, Mason

emphasized. The return on investment is hard to estimate since you don't really get a payback from a meter. Much like a speedometer," he pointed out, it simply allows you to make intelligent decisions. Wang system gives managethe tools it needs to make decisions on people and facilities, to see where the energy is going and how to conserve it.

As an example of the types of reduction the system has made possible, Mason noted that weekend consumption alone has been reduced by about 3.5 million kilowatthours (kWH) in the last year, a savings of some \$150,000. Overall, Langley reduced its usage by 8M kWH during fis-

Langley considers its system a prototype for energy conser-vation. There was no packaged software available to handle the data the center wanted, no hardware designed specifically for the applica-tion. This meant the center

had to begin the search for a vendor from ground zero.

Wylie Laboratories, Inc., a contractor for the center's Electronics Directorate, given a task order to find the most feasible equipment. After evaluating several manufacturers' equipment with respect to price and capability, Nasa chose two Wang 2200T central processing units, two CRT terminals, a printer and a drum plotter.

Mason has since replaced the 2200Ts with two 2200VPs with 48K and 64K bytes of memory respectively, to take advantage of their additional processing speed. Two 10M-byte disks have also been added, along with a graphics CRT terminal and printer.

To enhance the system's per formance, Mason has ordered an additional graphics CRT terminal and a graphics plot-ter. The CRT terminal will allow a preview of the plot before actually printing it, while the plotter will cut present plotting time by as much as 5% for the same work load, Mason said. Mason anticipated he may need the added time as more requests come in all the time.

The system's software consists of Basic programs written by Wylie Laboratories.

The entire system is dedicated exclusively to resource monitoring and is physically the base station, a small building designed especially for this purpose.

System Operation

During its feasibility study, Langley estimated that it would need 400 channels to handle all facilities at the center. Currently, 250 electric power meters, 13 steam meters and 20 environmental parameters are monitored. The system has a total capability of 400 channels, allowing for future additional growth.

The Wang 2200VPs scan all 400 channels every five minutes. Each complete scan requires 32 seconds. In addition, 55 channels are scanned every

After the data is collected, the system converts the digital signals into engineering units. While working out the timing for collection and conversion, Langley found that when it got up to 200 channels, it ran out of time to do the calculations. This prompted the installation of the VP systems.

After conversion, the data is stored on disk. Two full years' worth of information is kept at all times so that hourly averaged data can be picked up that far back.

A data averaging routine converts five-minute scan summaries to hourly averages, and hourly to daily averages. This information can then be tabulated and printed out or plotted on a graph.

The base station routinely prints 11 plots daily, in addition to special requests from the building managers and directorates. Special requests may be for a printout or plot 24 hours of five-minute data or for a monthly update on energy allocation and usage year to date. Reports may be broken down by building or by directorate or may cover the entire center.

In retrospect, Mason said, he is pleased that he chose the drum plotter rather than a flat bed, since this allows him to do unattended plotting.

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For Data Base, Operations Managers

AMA Finds Top Salary Dollar on West Coast

By Bruce Hoard CW Staff

NEW YORK — Data base administrators and DP operations managers are earning more money on the West Coast than anywhere else nationwide, according to a survey by the American Management Associations (AMA).

The study, Professional and Scientific Positions Report, also detailed college graduate hiring rates and reflected special budgetary increases for DP departments. Approximately 1,150 companies responded to the survey, which covered 1979 and the first five months of 1980.

While the national median salary for data base administrators is hovering at \$28,700, the West Coast boasted the top level, \$30,100.

Following in order were the Northeast, South Central, North Central and Southeast sections of the country. Those respective figures were \$29,500, \$29,400, \$28,400 and \$26,900.

DP operations managers also did best out West, taking in a median salary of \$30,400. The West was followed by the South Central (\$25,100), Northeast (\$27,400), North Central (\$26,900) and Southeast (\$26,100). The national median was \$28,000.

These figures are fairly consistent with those in another AMA survey issued earlier [CW, Sept. 1]. Not included in that survey, but covered in the new one, was salary information on methods and procedures analysts.

Analysts' Salaries

A methods and procedures analyst was defined as someone who coordinates proposed policies, procedures, systems, forms and methods to promote effective operations. He may also review the functions and structure of organization units to avoid overlapping or duplication.

In this category, the West Coast was not only defeated, but trounced by every other region. Leading the way was South Central at \$30,000. The Northeast was next at \$27,700, and the Southeast (\$27,000), North Central (\$25,400) and West Coast (\$25,000)

filled out the bill.

The study found computer science graduates to be competitive with, but not always superior to other young professionals when it came to salaries for first jobs. Comparisons were made with engineering, science and business positions, with business generally coming out lowest.

The salary range for computer science graduates started at a median figure of \$13,500 for two years of college and moved to \$16,800 for bachelor's degrees, increased to \$18,600 for bachelor's degrees with some predegree experience, went up to \$22,300 for master's degrees and slipped to \$20,700 for doctorates.

In the science area, the match-up between computer science and physics was a close one, with computer science showing significantly higher figures at the master's degree level, \$22,300 to \$19,200. Chemistry was also closely comparable to computer science, faltering only at the master's degree level where there was a \$3,400 gap.

Moving on to engineering, computer science took a decided back seat to chemical, civil, electrical and industrial

engineers. Of those, electrical engineers posted the highest salary, \$28,800 for graduates with doctorates.

Although most of the business statistics did not reflect doctorate-level salaries, computer science held a clearcut advantage up to the master's degree level. For example, accountants with a master's degree were starting out at a median of \$19,000, compared to \$22,300 for computer scientists.

\$22,300 for computer scientists.
Economists did a little better at \$20,100, but there still remained a \$2,100 gap between them and computer science grads.

Lawyers were more competitive at \$22,000 on the master's degree level, while MBAs with additional technical

undergraduate degrees made the strongest showing in the master's degree category with \$22,800.

Hiring rates for both computer science and engineering graduates consistently increased at a more rapid rate than salary increases for employees hired the previous year.

This was true with 53.2% of engi-

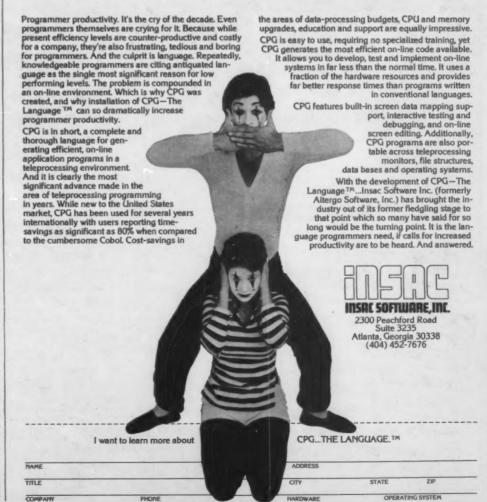
This was true with 53.2% of engineering respondents and 47.2% of DP respondents. The differential by which DP hiring rates exceeded salary increases ranged from a low of 2% to a high of 22.5% and an average 8.7%.

Companies surveyed attempted to compensate for the effects of this salary compression in DP and engineering by trying one of four strategies: more frequent salary reviews (29.4%), larger increases at salary review (26.9%), individual compression adjustment (33.7%) and general increase (7.8%). "Other" was chosen by 2.2%.

Of the companies contacted, 8.2% said they had alloted extra budgetary funds for DP salaries. Engineering responses reflected a slightly lower 7.7%.

In engineering, the differential of the engineering increases above the established salary schedule varied from a low of 6% to a high of 12% and a 9.5% average. In the case of DP increases, the separate schedule ran from 8.2% to 15%, with an average figure of 9.9%.

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Computer Security Tightened at Sandia Labs

By Jake Kirchner

CW Washington Burgau WASHINGTON, D.C. Federal auditors have all but closed the books on an investigation into unauthorized computer use by employees of a government nuclear weapons research center in Albuquerque, N.M.

Although it has not done a follow-up study, the Depart-

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ment of Energy (DOE) said re-cently the Sandia Laboratory has taken "commendable steps to beef up computer security following revelations of widespread problems at the

facility.
The DOE Inspector General's office here revealed last month it had found more than 200 Sandia employees had stored a total of 456 unauthor-

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facility's Control Data Corp.

The laboratory, operated for the government by Western Electric Co., performs nuclear weapons research and development and conducts research projects in such areas as solar

and wind energy.

Although the lab does classified work, the time-shared CDC 6600 system involved was used for unclassified pro-

DOE Investigation

The DOE investigation began a year ago when the Federal Bureau of Investigation informed the department it had found one of Sandia's employees using the CDC system to help local gamblers run a bookmaking operation.

The employee was fired and subsequent audit found hundreds of rather routine, although unauthorized, files that included several hundred games, such as Star Trek and Adventure, as well as poetry, jokes, personal letters, a beer collection catalog and bowling team rosters.

tial warning to purge the files of unauthorized data and were later reprimanded, according to DOF

One of the "most disturbing findings," the DOE said, was that a so-called "bomb book" was on the system and accessible to all users. This file contained numerous forms used as a checklist for setting up and monitoring nuclear test

While not classified, the bomb book was considered sensitive and was later removed from the system.
This problem and other find-

ings of the investigation raised questions about Sandia's overall computer security procedures.

DOE investigators The found, for example, that ' common practice at Sandia was to share passwords among staff people." Also, passwords were changed only once a year so that a person leaving Sandia employ could still access the computer system using another person's password.

eam rosters.

Another problem was with
About half the offending physical security. DOE said

rity checks on briefcases or kages carried by Sandia, DOE or contractor employees.

Policy Directive

Following the DOE investigation, Sandia issued a policy directive stating any use of a facility computer must be for

DOE also advised Sandia employees that personal or improper use of the computers would result in disciplinary action.

Employees were further reminded that misuse of government property is punishable by fine, imprisonment or both.

DOE called for better recordkeeping of computer access at the facility and greater dissemination of computer security guidelines to employees, as well as periodic random sampling of computer files to make sure no authorized data is being stored.

The Albuquerque facility and its companion facility at Livermore, Calif., operate more than \$100 million worth of computer systems., includ-

Three CA Ex-Employees Charged With Theft of Documents, Gear

mer employees of Computer Automation, Inc. have been charged with grand theft of documents and hardware from that minicomputer manufacturer.

All three of the suspects were employed in CA's factory service department before leaving to work at National Minicomputer Service, Inc., a competing firm. Materials al-legedly stolen include service manuals and other documentation, test cables and inhouse circuit boards valued at \$3 million, according to an Irvine Police Department

spokesman. A three-month police investigation leading to the arrests was originally triggered when some CA customers contacted the company, saying nearly identical CA services were being offered by National Mini-

Incriminating Evidence

The investigation culminated when police obtained a search warrant for National Mini-computer where they discovered proprietary documents bearing the CA logo.

However, National Minicomputer has not been implicated in the conspiracy and grand theft charges against these accused employees

They are Tommy Charles

Sammons, 51, of Huntington Beach, Calif., Steven Allen Hain, 29, of Orange, Calif., and 28-year-old Eileen Jackson of Santa Ana, Calif.

Sammons was service manager at CA and executive vicepresident and a major shareholder at National Minicomputer. He was released on his recognizance surrendering to authorities.

Hain also surrendered, and

Jackson was arrested shortly

The next court action in the case in scheduled for Dec. 12, when attorneys for both sides will gather to discuss possible pleas, according to an Orange County district attorney spokeswoman.

If convicted, each individual could face up to \$10,000 in fines and three years in jail.

Auditor Training Course Available for Non-DPers

CHICAGO - A computer auditor training program designed to help those without computer experience operate as DP auditors has been introduced by Shared Resources,

The course, which consists of 92 hours of classroom se sions and 84 hours of selfstudy assignments, is spread over a two-and-a-half month period

The first sessions concentrate on introducing DP concepts and terminology with a view to preparing the student to audit a Cobol program, said Thomas Noll, president of Shared Resources.

Further sessions highlight different auditing techniques and provide hands-on experience of hard-copy programs and on-line computer terminals

Students are given faulty and fraudulent accounts to audit and correct in class, though a major factor Noll stresses is the importance of the self-study assignments.

The program is offered in three formats: Public seminars are run on an interest and geographic location basis for \$895 per person; in-house sessions can be arranged by companies for a 20% to 30% discount and consortium seminars where firms club together to make up the numbers are also available for a similar discount.

Shared Resources, Inc., is at Suite 500, 625 N. Michigan Ave., Chicago, Ill., 60611.





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Catalog Card Maker's System Processes Votes

MINNEAPOLIS - On Nov. 4, the State of Minnesota processed the election votes of its 1.5 million residents here on the computer normally used by a manufacturer of catalog cards for libraries.

Catalog Card Corp. produces about 100,000 library cards per day from large data bases holding bibliographical information on 1.5 million book ti-

The firm has a customer base of approximately 25,000 public, school, corporate and technical libraries, and receives and processes several thounew titles each week from the Library of Congress.

Catalog Card was chosen as the vote-processing site because of its computer capabilities and the availability of facilities to accommodate hundreds of election workers, local and national media and volunteer phone-bank operators who received election results from local precincts.

System Change

One aspect of the project's success was Catalog Card's switch in August from an IBM 360/50 - which it had used for two years - to a Magnuson Computer Systems, Inc. M80/31 using Nixdorl Corp.'s EDOS operating sys-Nixdorf tem and its DEX on-line entry, according to Catalog Card's John Zacrep, director of DP.

Prior to selecting the Magnuson system, Zacrep considered a Control Data Corp. Omega and IBM's 4331 Model 2 and

Lancaster Given Award by Asis

ANAHEIM, Calif. -Wilfred Lancaster, professor of library and information science at the University of Illinois' Graduate School of Library Science, has received the first Outstanding Information Science Teacher Award from the American Society for Information Science (Asis) here recently.

Lancaster was cited for his 'contributions as an instructor, adviser, researcher and author for more than a dec-

The \$500 prize was donated by the Institute for Scientific Information and administered by the Asis Education Committee.

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4341, and went so far as to order an IBM system, he recalled.

That order was canceled when Zacrep learned of the price/performance ratio and delivery schedule available with the M80. The Magnuson system was on site and operating three weeks after it was ordered, Zacrep noted.

On Election Night, after local results were received by the phone operators, they

were fed into Nixdorf's DEX on-line entry system. The M80 continually processed the results and provided totals on demand, which averaged every 10 minutes, according to Zacrep.

Preparation for Election Night - including cataloging five assembler programs and running a brief systems test took one hour, Zacrep re-called. It took less than two hours, he said, for six data entry volunteers to learn DEX the machine's capabilities.

system. "Everyone at election headquarters was amazed at the performance of the system, Zacrep said. "Everyone but me - I knew it was fast and reliable.

Since the August installation, production processing has been running three times faster than the 360/50, Zacrep said. "With the 360/50, we had programs that stretched

In addition to Magnuson's price/performance and delivery advantages, Zacrep was interested in Magnuson's compatibility with advanced disk technology and the M80's upgradability features.

"The 360/50 wouldn't support the type of equipment we need to grow," he explained. "Our data base is so large, we have to go with large disks to get everything on-line."

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With Current Programming Methods

Applications Increase Unattainable, Martin Says

By Rey Malik

Special to CW LONDON - The 100% increase in the number of applications that has been predicted for the '80s will not be achievable using conventional programming methods and organizations, according to James Martin, author and lec-

Speaking at the first Deltak

International DP Training Conference here recently, Martin observed that the number of number of programmers needed for this will not be available to user organiza-

Although the pool of programmers is being steadily in-creased, more of these individuals are being snapped up by software houses, he explained. The author, whose next book will be called Applications Programming Without Programmers, warned that structured programming will make little difference.

Not Good Enough

Surveys have shown that structured Cobol, for instance, would give an improvement in programmer productivity of

up to 25% - not good enough. Yet an IBM Share/Guide study has shown that there was no technique based on using programmers in a centralized DP organization and conventional methods and languages such as Cobol or PL/I that would give even a 50% improvement, he said.

The reason, an IBM study has shown, is that programmers spend only 24% of their time on new applications, 12% on conversion, and 19% on system maintenance and the bulk of their time - 46% application maintenance.

And where did the bugs that programmers have to deal with come from? That, James Martin said, has been surveyed to death. The figures looked like this: requirements, 56%; design, 27%; coding, 7% and other, 10%.

Martin defined requirements as problems that arise as the result of errors, however caused, in systems analysis expensive ones to fix. When you look at programmer effort in fixing bugs, 82% of it goes into fixing the requirement bugs, he pointed out.

User-Written Applications

Great strides have been made in increasing the number of applications up and running where user departments are writing their own applications using terminals in the user department, he said.

In such cases, users tend to be using such languages and tools as National CSS' Nomad, STSC, Inc.'s APL Plus, IBM's Application Develop-ment Facility and Sperry Univac's Mapper.

These drive a bulldozer through existing conventional methodologies because they were user-driven. True, the DP department might regard this with suspicion, but some of the figures now show the increases possible in program-ming productivity to be quite startling, he noted

It is not just the lines of code per man-day equivalent, though figures of from seven lines of code-equivalent to 1,000 lines of code-equivalent have been recorded - without relying on genius. There is also the question of support.

The Bank of America, which has many of its users using Nomad without the good wishes of the DP department, now has over 500 applications written by users up and operating. They are supported by a software staff of six.

Nevertheless, training organizations continue to spend 80% of their time teaching the wrong things using the wrong methods, he said.

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> printer operates full duplex, or full duplex with local echo. Plus, it comes with EIA **RS232C** interface for use with all popular modems and acoustic couplers. What's more, the DECwriter IV is so versatile, it can be

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CDC Wants Payment for Canceled Art Tour

By Jake Kirchner

CW Washington Bureau WASHINGTON, D.C. — Control Data Corp. has asked the U.S. government to reimburse the firm for expenses it incurred setting up an American tour of Soviet-owned art that was canceled following the Russian invasion of Afghanistan.

CDC filed a \$1.8 million claim with the U.S. Comptroller General's office here Nov. 17, arguing the money was spent "in good faith at a time when increased cultural interchange with the Soviet Union was being promoted as part of national policy," according to Lawrence Perlman, CDC vice-Lawrence Perlman, president and general counsel.

The company had arranged for the two-year tour of works from Lenin-

grad's famed Hermitage art museum not only for international good will and for the sake of art lovers, but in the expectation Soviet profits from the sale of art books and reproductions of the paintings would be used to pur-chase a CDC computer system.

However, Perlman pointed out, the claim "doesn't have anything to do with the profits we might have made in connection with the sale of any equipment." The company is interested only in being reimbursed for expenses for setting up the tour, he said.

U.S. Retaliation

The firm had printed some 250,000 catalogues for the show and had arranged to cover travel cost and other expenses of the tour. The show was

canceled earlier this year after the U.S., retaliating for the Afghanistan invasion, refused to protect the art works against attachments that might have been sought by American parties seeking payment on outstanding claims against the Soviet government.

If the Comptroller General approves the claim, Congress would have to appropriate the money to reimburse Control Data. Perlman said the firm expects the government to respond promptly" to the claim.

While the success of the claim is not at all assured, Perlman noted a recent precedent for the CDC action. Congress this year, at the request of the Commerce Department, appropriated \$10 million for the U.S. Olympic Committee to defray expenses incurred by the committee in helping U.S. athletes prepare for the 1980 summer games in Moscow, which were boycotted by the U.S. at the request of President Carter.

CDC Files Suit **Against Iran**

CW Washington Bureau WASHINGTON, D.C. — Control Data Corp. has filed a \$28 million law suit against Iran, joining a long list of American firms seeking a share of that country's assets held in the U.S.

The suit, filed Nov. 19 simultaneously in federal court here and in Minneapolis, named as defendants the government of Iran and more than a dozen Iranian government agencies and government-controlled organiza-

Perlman, CDC president and general counsel, said in a telephone interview from Minneapolis the company is owed approximately \$5 million on contracts with those Iranian organizations.

The balance of the \$28 million claim, he said, "is related to the value of equipment which we have not been able to regain possession of, breach of contract claims and some other monies we've advanced in connection with various business transactions in Iran.

Compensation Sought

The company is also seeking compensation for spare parts it cannot recover from Iran and payment for a CDC-owned building in that country

that has been damaged, he added. CDC, which has a "whole range of equipment" installed in Iran, from small Cyber 18s to systems in the Cyber 170 series, has continued to receive payments from some of its customers in Iran, Perlman said.

He noted the courts cannot act on the suit until the U.S. government unfreezes the Iranian assets in this country. He also said he expects Washington will request a stay of the CDC legal action as has been the case in other suits pending against Iran.

If a stay is granted by the courts, action on the suits would be delayed even after the Iranian assets are released.

"I've instructed our lawyers not to oppose [a government stay request] on the grounds that the government wants the stay in order to keep things in status quo while it carries out the negotiations for the hostages," Perlman said. "We do not want to do anything that would interfere with those negotiations.



'No Thanks. I Never Play Anyone Who Doesn't Suffer When He Loses.'

On March 18, 1981 Computerworld Extra! will devote an entire issue to an in-depth look at "Communications Systems in the 80's."

Computerworld Extra! is an extra issue of Computerworld – the And more than half-a-million

second we have done - to be published this March 18th. It will Computerworld readers will be appear in what our Editor, Drake Lundell, calls a "tabazine" format. This means glossy, full-color covers on the outside, and a magazine format inside (printed on super calendared newsprint) and tabloid-size throughout.

This issue of Computerworld Extra! will focus its entire editorial content on a single subject: "Communications Systems in the 80's." Top experts from all areas of the communications field will write magazine-length articles on a variety of topics including: Integrating Voice and Data Networks; The State of Videotex in the US, Uk, France, and Canada; Network Manage ment; Satellite Technology in the 80's; The Past and Future of the Communications Act and Federal regulations; Network Standards

and Protocols; and Future Directions in Telecommunications Technology. Plus, there'll be Wrap-up and Analysis articles for Data Communications Software, Data Terminal Equipment, and Data Communications Equipment.

Computerworld Extra! will be received and read by 107,000 paid Computerworld Subscribers (ABC 6/30/80) and more than 430,000 pass-along readers (Becker Research Corporation). These professionals have extensive purchase decision influence especially in the communications market, as our research indicates:

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	Subs	cribers	Pass-alo	ng Readers	
	Percent	Projected #	Percent	Projected #	
Modems	48%	31,000	31%	78,000	
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Data Comm Terminals-Smart	34	22,000	33	83,000	
Multiplexers	30	19,200	29	73,000	
Distributed Processing					
Equipment	28	17,900	18	45,000	
Computer Services and					
Timesharing	26	16,600	20	50,000	
Teleprinters	26	16,600	15	38,000	
Graphics Terminals	22	14,100	7.	18,000	
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Source: "A Profile of Computerworld Subscriber	s and their Comp	sanies" - Becker Resea	irch.		

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Managers on the Move

IAMES W. BISHOP has been elected vice-president of management information systems at Lanier Business Products. Inc. in Atlanta.

Bishop will be responsible for all DP activities, directing and managing the company's computer center at the Tucker, distribution site. Additionally, he will be in charge of design, development and implementation of computer systems and procedures, longrange DP plans and selection of computer equipment and applications software pro-

Previously Bishop was vicepresident at Hartz Mountain Corp. in New Jersey. He has also held management posts with United States Lines, Inc., Kidde Computer Services, Franklin Mint and Western Electric Co.

JOHN K. BUCKNER has been named vice-president and chief financial officer for Prime Computer, Inc., Natick, Mass. Buckner will be responsible for the functions of the controller, treasury, information resources and corporate services

Before joining Prime, Buckner was vice-president of administration at Millipore Corp. in Bedford, Mass., which he joined when Waters Associates was acquired by Millipore. Prior to this, Buck was vice-president and chief financial officer at Wa-

He was also employed by Eastern Gas & Fuel Associates as vice-president of financial operations with responsibility for corporate finance and DP. Buckner received a B.A. degree from Williams College,



James W. Bishop

an M.S. degree in nuclear engineering from MIT and a Ph.D. in mechanical engineering from Stanford University.

Air Products and Chemicals, Inc. of Allentown, Pa., has ap pointed JOSEPH C. SCHUL-TER, MATTEW G. ZELL-NER, TIMOTHY J. CENNA and PETER J. TEMPLIN as managers of management in-

Schulter was named group systems manager of the firm's Gas Group and will coordinate the design of a distributed computing network to support the group's operations. Prior to his appointment he was manager of long-range planning in the management information department. Schulter holds an M.S. degree in business and economics from Lehigh University, Bethlehem. Pa.

Zellner was appointed group systems manager of the Pro-cess Systems Group (PSG) and will develop systems for the management of engineering projects. Zellner joined Air Products in 1960, most recently as manager of research planning and coordination for the Gas Group and PSG. He received a B.S., M.S. and Ph.D. in chemical engi-



John K. Buckner

neering from Lehigh Univer-

Cenna was promoted to manager of applied statistics, responsible for providing for-mal statistical analysis capability in experimental design, quality control, market survey design and statistical modeling. An employee since 1977 Cenna holds a B.S. in general engineering from the U.S. Coast Guard Academy, an M.S. degree in applied mathematics from Rensselaer Polytechnic Institute, Troy, N.Y., and an M.B.A. from the University of New Haven, Conn.

Templin recently joined Air Products as manager of information retrieval systems with responsibility for administering and providing in-house and commercial information systems.

Formerly with the Pennsylvania legislature, he was re-sponsible for bill and statute processing and retrieval. Tem-

plin has a B.S. degree in industrial engineering from Lehigh University.

NORMAN STAFFORD has been appointed manager of DP at Tariff, Inc. of Metu-chen, N.J., where he is responsible for computer systems programming operations and their control functions.

Prior to joining Tariff, Stafford was project leader for the Boy Scouts of America, Inc. and a senior analyst/-programmer for John Wiley & ons. New York.

Stafford received a B.S. degree in business management from Rutgers University.

Tariff provides preaudited, computerized freight payment plans to the transportation in-

JOSEPH McKISSICK has joined Twin County Grocers, Inc. of Edison, N.J., as director of management information services. He will be responsible for DP, systems and programming and technical support.

Previously, he was vice-president of information services with Hudson-Thompson, Inc., an Alabama-based retail and wholesale company. Prior to that he served in the DP division of Fabrics of America, a subsidary of Allied Products; Corp. of Chicago.

Book Blames Methodologies For Role in Software Crisis

SEATTLE - The "software crisis" is worsened by current software engineering methodologies, according to Robert L. Glass in his book, Software Soliloquies.

Glass charged that the software industry suffers from such maladies as a stuck technology in software checkout, a general lack of understanding of the individual contributor, a refusal on management's part to examine the software product and a communication chasm between academic and industrial specialists.

Glass also maintained that many of today's commonly accepted practices and teachings are actually counterproductive, and writes of this dilemma in a humorous, anecdotal style.

The book, which costs \$9.95 including shipping, is pub-lished by Computing Trends, located at 6925 56th Ave. S., Seattle, Wash. 98118

Advanced Office Systems Key Topic of ASM Meet

LAS VEGAS - The advanced office, systems concepts and the rapidly changing world of information resource management will be the key topics at the May 10-13 conference of the Association for Systems Management (ASM) here at Caesars Palace.

Focusing on the many changes expected in the next few years because of technological advances, the program features a series of seminars on advanced office systems.

Registrants in the Management Development Program will be able to complete the final level of the program. Instituted in 1973, the program is being phased out this year to permit greater flexibility in educational programming, an ASM spokesman said.

More information is available from ASM at 24587 Baglev Road, Cleveland, Ohio 44138

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Training Device Simulates Nuclear Plant Control Room

By Bruce Hoard

CW Staff
SEABROOK, N.H. — The Public
Service Company of New Hampshire
has taken the wraps off a new \$5 million, computer-based control room training simulator.

The simulator - a duplicate of the actual control room at the Seabrook nuclear power plan here - is designed to provide trainees experience in handling day-to-day conditions as well as emergencies that may crop up at the plant.

Computerwise, the training device, which was built by the Link Division which was built by the Link Division of the Singer Corp., features a Mod-comp Systems Classic and a Systems Engineering Laboratories, Inc. (SEL) 3255, according to Peter M. Richardson, senior instructor at the training center.

The real control room at Seabrook also uses a Modcomp Classic. "We call it a logic by computer," he explained. It carries all the operator-assist pro-grams. In the training center "we have an exact duplicate of the Modcomp not for direct simulation - but for interface for those logic-by-computer programs.

For example, if an operator wants to change power, he plugs in the amount of power he wants to change and the logic-by-computer program on the Modcomp will tell him how much of an adjustment is required.

The two computers interact as part of the plant's video alarm system. Be-cause there are no field transmitters, the 3255 assumes that role and supplies data to the Classic, which interprets it for emergency conditions. In

(Continued on Page 26)



Computerwise is a computerized simulation of the control room at the Public Service Co. of New Hampshire's Seabrook nuclear power plant.

The Situation. Piecemeal approaches to on-line systems minimize potential productivity gains.

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Analysis. In building on-line systems, many users have adopted piece-meal approaches which have focused on one problem or need at a time. They have attempted to fulfill their needs by first buying a teleprocessing monitor and then interfacing it with other packages for such vital needs as data entry, program development, inquiry, etc. The result however has often been a non-integrated system that requires enormous maintenance and is generally cumbersome

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Series 80 T-ASK the on-line query system that allows users to interrogate the data base directly.

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For more information on how Cincom's Series 80 DB/DC System can solve your on-line productivity shortfall, write our Marketing Services Department, 2300 Montana Avenue, Cincinnati, OH 45211. Or call our User Information Hotline: 513/661-6000.

Hospital Cuts ECG Analysis Time in Half

By Bob Johnson

CW New York Bureau DAYTON. Ohio — An advanced medical system that hospital spokesman said consistently saves electrocardiogram technicians and physi-

cians up to 50% in graphreading time daily has been installed in Grandview Hospital. Ohio.

The Hewlett-Packard Co. Regional ECG Analysis and Management system (Realm), currently at Grandview, is connected to its Ambulatory Care Center in Washington Township by telephone lines allowing ECG technicians to edit and analyze graphs from two clinical sites instead of just one as in the past.

Information is transferred from the ECG cart via telephone lines by FM carrier in a maximized mix of digital and analog methods.

'Real-Time' Data

It is now possible to send critical ECG data "real-time" from any bedside at Grandview or from as far away as another city or state and receive an analysis from the main CPU (an HP 1000, 2113 E), located in Dayton.

Grandview claimed that Realm can process and analyze an EDG graph within 45 to 50 seconds, a great deal faster than humanly possible.

Leslie R. White, D.O., Director of noninvasive cardiology at the hospital, said, "not only is the system beneficial in time savings, but also it has in-creased the accuracy of the data being processed.

The storage and retrieval of information about patients who have had ECGs taken is a plus for the ECG staff as well as the patients who benefit because of the better service they receive, he added.

According to White, a 25% savings in technician time proves the system's worth. It also enable a shorthanded ECG unit to function more quickly and diligently.

The technicians stated that the system has alleviated routine tasks such as graph measurement, evaluation and report printing.

Productivity Graphs

In addition, Realm identifies every technician using the system, how many graphs were run and it documents the number of errors made on hard copy. This record offers administrators the ability to chart productivity. To their surprise, many technicians who were thought to be slow

workers were in reality producing a substantial amount of work.

One reason why Grandview chose the HP system over others was the over-reading. capability that can read three ECG's simultaneously. The decisive factor, however, was that Realm software could be modified to meet their particular needs.

Certain criteria must be considered when installing this type of system such as the number of technicians, number of patients and amount of clinical facilities. Grandview felt that Realm could fill the

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Nuclear Control Room Simulated

(Continued from Page 25) case of an emergency, information is transmitted to CRTs throughout the facility.

Building time for the system was about a year, according to Richardson. After the contract was signed, Public Service spent three months supplying pertinent data on the power station to Singer. After that, Singer employees wrote the necessary programs.

Other Simulators

The company has produced similar simulators for other clients, such as the National Air and Space Administration (Nasa), so a great deal of the necessary software was already in place, the instructor commented.

Singer and control board operators will be supplying new programs for the simulator as part of the ongoing training program.

Tasks to be performed by trainees include heating up and shutting down the base loaded nuclear plant. However, those particular jobs are not likely to be performed often because a base-loaded plant rarely varies its power supply, running at 100% until it needs to be refueled, Ri-chardson said. "Only a few plants do that," he added.

Surveillance Tests

Most of the trainees' time will be spent on what he called "surveillance testing," which ensures the operability of plant equipment. Fifty-two major systems are monitored on a weekly, monthly or quarterly basis.

Typical malfunctions pro-grammed into the simulator include loss of feed water, loss of both normal and vital power, pipe leaks and blown fuses in the instrumentation,

Richardson said.

Most of the 38 potential operators at the facility have been involved in the Navy atomic submarine program. Before going on-line, they will spend 300 hours in the simulator and over 1,000 classroom hours studying college-level courses.

Instructors will be able to create unusual conditions in the simulator to see how trainees react. They will also be able to stop the action on the simulator at any time, back it up and discuss operators' options.

William C. Tallman, chairman and chief executive officer at Public Service, pointed out the value of having trainees work in a training atmosphere identical to that found in the actual work

Three Classrooms

In addition to the simulator, cludes three classrooms equipped with rear-screen projection rooms designed for audio-visual presentations.

Trainees face a vigorous regimen. They must meet educational standards set by the Nuclear Regulatory Commission, (NRC) complete the Seabrook course and then pass vet another test to obtain an NRC operating license.

Once the controversial nuclear plant begins operation -projected to be in 1983 by company officials - retraining on the simulator will be required once every six weeks, Tallman said.

About 40% of the first unit at Seabrook is complete, a spokesman said. Construction of the second unit has been delayed until the financially strapped utility can reduce its share in the plant from 50% to

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Delta Replaces Fuel Trucks With Computerized Piping

By Deborah Wise

CW Staff ATLANTA — Delta Airlines, Inc. has grounded its fleet of refueling trucks and replaced them with an automated

fuel piping system.

The computer-directed automatic control and information system at Atlanta International Airport Midfield Terminals "has been working without problems from the day it went into operation on Sept. 21," said Bill Berry, a Delta Airlines spokesnan. On average, Delta pumps 788,000 gallons of fuel per day, he said.

The system, which cost approximately \$10 million, was designed by the Turbitrol Co., a division of the

Taulman Co.

The minicomputer-based control system performs all monitoring and control functions and generates operating reports and information regarding the status of all major operating equipment in the system. According to Berry, Delta has not experienced any problems to date.

Turbitrol designed the software and provided the Digital Equipment Corp.-based system that includes a

Facilities Set Up For Emergency

BOSTON — Emergency DP facilities have been set up in Rosendale, N.Y., and Glocester, R.I., by Data-Site, a joint venture established by Wright Line, Inc. and the Iron Mountain Group.

The shell sites offer 8,091 and 5,252 sq ft of space, respectively. Each contains raised flooring, library capabilities, phone lines, normal and emergency power and water supply and 75 tons of air conditioning capacity, the firm said.

No computer equipment is being offered at either site.

A spokesman for Data-Site said, "In the event of a disaster, fewer than 10% of existing company emergency contingency plans will work."

The annual charge for the shared shell site is \$12,000. More information can be had by contacting Bill Dryer, Data-Site, 160 Gold Star Blvd., Worcester, Mass. 01606.

Management Seminars To Cover Innovations

PARK RIDGE, Ill. — Three seminars on "Innovations in Management" will be offered by the Data Processing Management Association (DPMA) Education Foundation, in association with Fundamentals in Responsibility Management, Inc., in Chicago, Jan. 20-22 and Feb. 10-12 and Toronto Feb. 10-12.

The registration fee in the U.S. is \$345 for DPMA members and \$380 for nonmembers. In Canadian dollars the fee is \$400 for members and \$440 for nonmembers.

More information is available from Fundamentals in Responsibility Management, 1032 N. Lombard, Oak Park, Ill. 60302 or, in Canada, Jackson-Smith Ltd., 56 Shepard Ave. W., Toronto, Ont., Canada M2 N1 M2.

DEC PDP-11/03 with DEC RL/01 disks, a dual-floppy disk system, DEC VT100 CRT terminals, DEC LA120 report and event writer and a Turbitrol Series 1600 I/O system.

Before the system was installed Delta used a combination of underground pumping lines and fuel trucks that ferried fuel from Delta's fuel farm to the planes at Atlanta's old airport. Now the five-minute truck journey has been dispensed with and Delta's 340 daily flight departures are serviced by underground fuel lines monitored through the computer system.

"Now you don't have to wait for the truck to get into position and there's no loading up time," Berry said.

Honeywell Users Form Nahu

WALTHAM, Mass., Nov. 10 — Approximately 2,500 users of Honeywell, Inc. computers have united to form an international organization known as the North American Honeywell Users Association (Nahu), the company said.

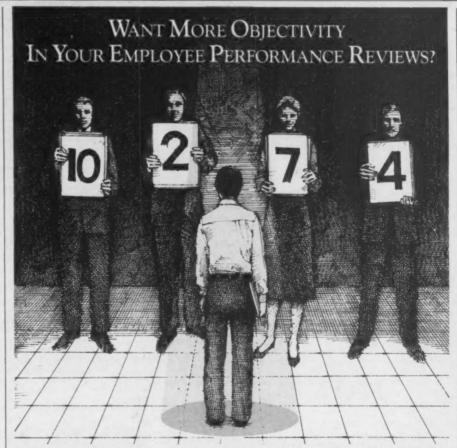
The primary purpose of the group, which will function as a control group concerned with the interests of small and medium system users (Level 6, Level 62 and Level 64), is to promote the free exchange of information between member units and Honeywell.

Nahu's objectives include expanding its members' knowledge of automatic data processing, providing adequate communication among members to ensure a sustained effort in problem-solving techniques and maximizing state-of-the-art procedures, Honeywell said.

The Nahu board of directors has planned the first national conference for 1981, which will be held at the Galt House Hotel in Louisville, Ky., May 11-14. The agenda will include various sessions on numerous topics of interest to Nahu members as well as several demonstrations and speakers.

Further details on Nahu are available from Tom Eifler, Honeywell, Inc., 200 Smith St., Waltham, Mass.

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EDITORIAL

Work Is Work

People have to be made to feel important and be treated with respect and openly expressed concern, whether they work in data processing, teaching, publishing or street cleaning. And this has nothing to do with how much money they are paid.

That much was clear in the findings of a recent International Data Corp. survey of data processing employees and management published in Computerworld last week.

The managers surveyed said the only way to keep employees

is to pay higher and higher salaries.

The employees, on the other hand, said salary is an important motivator in accepting a job but, once employed, its importance pales in the face of other considerations. For example, they want to be noticed and rewarded for their accomplishments, trained so they can advance more quickly and considered in decision making that affects them.

Why don't managers and employees talk to each other?

Even though many studies have shown the typical DPer relates better to his CRT terminal than to the human beings around him, data processing professionals are basically no different from any other people - only their circumstances are different. Because there has been a shortage of skilled personnel in computing, DPers have the freedom to quit a job with greater ease than people in publishing or teaching, for example. After all, there's always another job around the corner probably a better one, in fact - and if not, one can always freelance until one turns up.

This is a luxury enjoyed by few other professionals. It seems that DPers haven't been forced to get along with others. When the going gets rough, they simply leave. Continuous availability of jobs encourages a certain laziness on the part of both em-

ployee and management.

One can't help but be reminded - by the daily newspapers and television reports - that many of our country's citizens aren't so lucky. Most people collecting unemployment checks as a result of the current malaise in the auto industry, for example, have probably long forgotten their beefs against their supervisors and the frustrations they may have felt working at the same job day after day with little hope of advancement.

Further, many teachers, clerks, fire fighters and police officers face uncertain futures as funds that pay their salaries are shaved as the current conservative mood takes over the country. Most DPers don't have these concerns. It's time DPers started doing what everybody else has been doing for years talking things over and making them work.

After all, when all is said and done, work is work.

DATA PAST

Five Years Ago Dec. 17, 1975

NEW YORK - The then-chairman and chief executive officer of General Electric Corp. told the court hearing the government's antitrust suit against IBM he knew of no IBM practice or act that forced GE out of business in 1970. Instead, Reginald H. Jones described the exit as a missed opportunity on GE's part.

WASHINGTON, D.C. - Arguments for and against patenting of software filled the historic chamber of the U.S. Supreme Court as attorneys completed the process of submitting the Thomas R. Johnston case to the high court for review. There were no requirements or precedents governing how soon any decision might be rendered. However, Morton C. Jacobs, Johnston's attornev, said he wouldn't be surprised if a ruling came down in "about a month."

> Eight Years Ago Dec. 12, 1972

ANAHEIM, Calif. - Most of the planners and attendees of the Fall Joint Computer Conference here pointed to the increased emphasis on user topics, the move into vertical sessions aimed at specific markets and the switch of the site to Anaheim. In May 1972 the show's sponsor, the American Federation of Information Processing Societies, said it was "at the crossroads" of some very big decisions, including the possibility of changing the format to only one conference a year. That decision was made only a few weeks later, and this fall conference was seen by many as a transition.



LETTERS

Doomsday Predictions

There are several counterpoints that arise from reading the article on social problems allegedly caused by computer technology [CW, Nov. 3].

The first of these is how anyone may

assume that one singular influence, no matter how powerful, can result in the complex sociological consequences which Dr. Robert Parslow predicts. Parslow's doomsday predictions may or may not be accurate, but his explanation of their causes seem to be as inane as are some of the oversimplifications of earlier soothsayers.

Does anyone remember Dr. Nobel's prediction that his invention, dynamite, would be the ultimate weapon to end all wars? How about the common belief, prior to the invention of steam propulsion, that anyone moving faster than the speed of a galloping horse would necessarily disintegrate into the universal ether? Or that the industrial revolution would result in a world of human slaves entrapped by their own technology?

Quotes from Parslow's speech bear all of the earmarks of such technological paranoia. He refers to the ubiquitous, Orwellian (and, in the article, undefined) "They" when wringing his hands about lack of information privacy in a computerized society. "They" will get any information about you in this society.

I recall when such corruptive and degrading influence was blamed on Communism, or on some other imaginary or real enemy such as Hollywood, television, the automobile (and its back seat) and drugs. Now it's the com-

If one accepts that man is capable of either building or destroying himself and his creations, then one must accept the strong likelihood that the race of man is also totally responsible for the results of its actions. The tools used in either creation or destruction do not move of their own accord.

It's interesting to note that in the name of some obscure cause, interest or motivation, such obsolete and simplistic opinions as Parslow's still gain enough credibility to reach the ears and eyes of the general public. Worse, this scholar is assumedly no ordinary street radical or back-to-nature proponent, but by his credentials purports to be a member of academia, who should know better.

Reinhard Mirkovich

Lowell, Mass.

Professional Attitude

I must take issue with Larry Long's assertion that resistance to computerized medical information systems is a failure on the part of the physicians to "enhance the level of their profession" [CW, Nov. 17]. In evaluating a tool or technique, the physician must ask two questions: Will this help my patients? Is my time well-spent doing this? For those cases where the answer to either question is yes, physicians are likely to accept and support the system quite readily.

A dramatic example is computerized axial tomography, CAT scanning. This process gives physicians images much superior to standard x-rays and fre-quently allows them to avoid expen-

sive and dangerous procedures.

On the other hand, if you ask a physician to type into a terminal drug or-ders he has just finished writing on the patient's chart, he is likely to perceive that the benefits of this activity accrue not to the patient or physician, but to the hospital's billing office, and to decide that his time might be better spent in treating patients. Insistence by physicians that they be allowed to concentrate on the practice of medicine to the exclusion of clerical tasks is not a failure to enhance their profession. It is the very essence of professionalism.

Medical Association of Georgia Atlanta, Ga.

HUMAN CONNECTION/Jack Stone

What Do DPers Respect in a Manager?

"Job performance measurements? Performance standards? In a computer center? Listen to me. My systems and programming staff are in a continuing merry-go-round as they try to respond to what our users need - or think they need.

Performance standards imply an environment where planning stability prevails - which we don't have. Documenting job descriptions, task assignments, performance goals and measurement factors in the systems development business is an exercise in

All this from a fast-track computer center manager.

For a moment, I couldn't imagine why he wasn't taking action to correct his situation, and then I realized he didn't understand: (1) the true nature of his job, which, in large measure, relates to personnel management; (2) how his employees are impacted by working in a chaotic work place; or (3) why he probably wasn't held in very high esteem.

Survey Results

To provide further insight into the subject, I want to relate the preliminary results of a recent survey taken in a large organization, which was given to managers and employees in the computer center, as well as user departments. Those surveyed were asked to identify the distinguishing features of a good manager. Their answers are shown in the figure.

The reader should note the contrasting results in the areas of "job competency" (2) and "fairness" (8)

Survey respondents were also asked to identify managers they considered to be exemplary. The survey team in-terviewed some of these managers with the objective of finding commonalities of good management. The team first learned that there wasn't much in common with the styles of these managers, which were strongly dependent on a range of factors, in-

· Personality of the manager.

. Types of people with whom the manager works

· Type and organization of work performed.

· Systems and processes in the department.

The team did, however, uncover some functional similarities. These 'good managers" were people who:

Shared business information with the staff, in one way or another, in-cluding "sensitive" information (as opposed to confidential).

· Clearly communicated job priori-

· Evaluated the staff well so that all employees knew where they stood.Were knowledgeable and experi-

Order Responding	MANAGERS		EMPLOYEES	
	Rank Order	Percent Responding	Rank Order	Percent Responding
1. Friendly, good rapport, listens	1	75%	1	58%
2. Competent in the job, knowledgeable	2	50	7	12
3. Delegates well	3	30	5	38
4. Develops the staff	4	30	4	44
5. Plans ahead, well organized	5	28	3	47
6. Encourages cooperation	6	28	8	27
7. Gets the job done	7	25	-	-
6. Fair to employees	8	23	2	51
9. Keeps staff informed	9	18	-	-
10. Supports the staff	10	15	6	36

Manager and Employee Views of a Good Manager

enced in their fields.

· Build a cooperative spirit with the

The survey team also found similarities among the personalities of "good

· Genuine interest in people.

· Sincere trust in the staff. Strong desire to grow profession-

ally themselves.

· Knowledge of own strengths and weaknesses.

· Deep commitment to department's program.

I'm not suggesting that the survey results represent the final authority on the matter, but I am noting that the professional and personal attributes of the typical information systems manager that I've met are so different from those described above, that I can't help wondering just how many of them are treated with respect by their employ-

SOFTLINE/Werner L. Frank

The Software Environment: A 30-Year Evolution

In the early 1950s there was no software environment. Machines stood bare after switch-on or, more than likely, contained a random pattern of bits in the memory.

But presto, in response to a button push or switch setting, the automatic bootstrap was loaded into the first few positions of memory and the system

Next came the external response. This involved input processing of a sequence of characters by the "booter," which added this data to the very primitive, hardware-based (our first version of hardwired software?) bootstrap itself. This process was repeated several times and, as soon as the memory-based code was suitably extended, the system was prepared to read in the well-structured object code of a specific run. That was environment!

Input to the computer was more ofthen than not via punched paper tape, although punched cards came very quickly thereafter. The specific run program had to be preceded by a specially spliced header, if the medium was tape, and preloaded with a fixed set of binary punched cards when em-ploying cards. This header, which extended the boot strap, was the first instance of the more complex world of the JCL of today.

The run program also had to be manually combined with support software such as the cord dump routine, the

trace program, the elementary function subroutines or the input/output utilities. Each user, therefore, generally defined and produced his own software operating environment for each run, on an ad hoc basis. Machines in the early 1950s were word-oriented (36 to 40 bits) and had at most 1,024 words. Hence, users were very conservative in their development of such an environment.

Early Assemblers

In the beginning, the coding itself was machine language, often ex-pressed in hexadecimal notation. But then came the assembler, which gave the first assistance to the programming implementation process. These early assemblers, being one-pass, had very strict constraints -- requiring code assignment to specific memory locations and the requirement for specifying certain parameters and values in a regimented order. That was how it was in

Assemblers got to be more complex. They became multipass vehicles absorbing more of the bookkeeping tasks and therefore freeing the implementor of certain notational chores. They also could include, on call, certain standard

By 1957, the assembler was extended and became known as a compiler, mainly because it now had sufficient capability to do more than convert one

(Continued on Page 30)

READER COMMENTARY/Joseph T. Rigo

Poor Organization Kills a Technical Manual

A technical writer's most important task is to organize the material. A topic must be discussed in one place, and the discussion must include all information that the reader needs to get some work done.

Poor organization kills a manual more effectively than any other problem. The reader simply gives up trying to find anything. When the manual is well organized, the reader at least knows where to scratch in his own notes to make up for deficiencies in the

Now, no one is going to argue against good organization. But they may dis-agree on what it is. The disagreement may center on whether the writer is a manager, a programmer or a systems analyst.

Take, for example, a programming standards manual organized by a man ager. Managers like an organization that reflects the corporate structure.

Their manuals tend to have separate sections for data center operations, security, auditing, data base management and data communications. Each department or staff specialist has a section in the manual. A single topic, such as file design, may turn up in two, four or every one of these sections. A programmer is expected to keep up with all of them.

In practice, the programmer will read the data center's section and ignore everyone else. The data center has the dards. All of the others will give way in the face of project deadlines.

When writing for programmers, it makes sense to organize the manual by technical subject. There may be sections on file and data base, program design, source code libraries, program testing and other job-related topics.

Each section is complete. It may even include instructions for locally developed utility programs that support the programming task.

More Sense

A by-product of this organization is that everything makes more sense. The data center's rules for files are on the same page with the security staff's requirements. The conflicts between them are obvious and can be cleaned up before the manual is published.

Manuals designed by programmers also have distinguishing features. Characteristically, each program is lovingly described, and there is a complete set of file layout charts.

On the other hand, the manual will say next to nothing about how the programs and files relate to each other. There is virtually no description of the system as a whole or of any function that involves more than one program. A JCL listing may be the only clue of how the programs are organized into job streams.

(Continued on Page 30)

The Software Environment's 30-Year Evolution

(Continued from Page 29) source statement to one object code line. The system could fully manage its operation via a number of reporting documents, mapping out the code and providing glossaries, as well as automatically generating a good amount of object code from much less source code. These capabilities led to the adoption of the term "automatic programming," although very little was really automatic.

The compiler was extended by the input/output control system (IOCS), which was the first significant step in softening up the difficulty in using the fixed hardware. Through the IOCS the programmer received assistance in communicating between his program and the peripheral world surrounding the CPU. The interface between the input and output calls from the program to the IOCS became the most important function of the embryonic operating system.

Thus, in the late '50s, the application programmer had at his disposal a general compiler (or sometimes a special higher order language), the I/O control function and the beginning of the operating system.

CPU memory had now grown to more substantial proportions. The typical Univac 1103 had 1,024 words of 36 bits each and what amounted to the first virtual memory, being able to extend its 1K byte of internal memory by automatically addressing 16K words on a magnetic drum.

The IBM 1400 series was subsequently introduced and provided up to 16K bytes

617-437-1100

character positions of memo-

The resident software environment supporting the application program in the early 1960s occupied a few thousand bytes of the typical sized memory.

Next Wave

The next wave of innovation took three paths. First, the operating system took on more responsibility and became more complex. Secondly, the I/O system was expanded to incorporate an ever increasing number of access methods to the stored data, as well as more I/O handlers to a variety of peripheral devices and makes.

The third contribution represented a new direction. This was the teleprocessing (TP) monitor which absorbed a number of I/O functions and operating system responsibilities. The TP monitor entered the scene in the mid-1960s in answer to the beginning incorporation of computers in communication environments.

At that point in time the application software implementor was obligated to provide the processing logic and the data file structure and organization. The rest of his needs could be derived from the three environmental components of the day: the operating system, the 1/O control and the TP monitor. This software

complex had now grown to require tens of thousands of bytes while the CPU memory also increased to sizes as small as 4K bytes, but also reaching as high as 512K bytes or even 1M byte. The more sophisticated software environments actually began using more than 100K bytes of memory.

The time was ripe for laying the groundwork for the next stage, which ultimately provided a quantum jump in enhancing the software development process and enriching the implementor's environment. The end of this process was the emergence of the data base management system (DBMS) in the early 1970s. But these systems were preceded by the file management system of the late 1960s.

The file management system never became a part of the operating environment. They typically became application program instances themselves and, as in the case of the RPG, represented nonprocedural language approaches to implementing applications, standing in parallel and as an alternative to the evolving spectrum of procedural languages which were also proliferating in the '60s.

The DBMS era began in the early '70s and pervaded the decade. The application program was now surrounded on four sides — by the operating system, the I/O handlers, the

TP control and the heralded DBMS. It would appear that the application implementor had his day in being given the ultimate of support at, of course, the cost of an extended software environment, typically requiring hundreds of thousands of bytes of committed CPU memory and some additional hardware resources to make all the pieces work together.

That's where we are as we begin the decade of the '80s. A software environment of one million bytes is not unusual. But like the proverbial amoeba, another split of functions is now in process taking further capability away from the operating system utilities and the DBMS and emerging with another major module for the software environment of tomorrow. This is the data dictionary, which is rapidly achieving status in its own right as the central focal point for both definition and control of all data elements.

There is yet another major element to emerge and be given equal recognition with the five basic environmental modules already enumerated. This component is the transaction processor, which will be the important contribution of the mid-1980s in completing the overall software environment. Of this we will speak in another column.

Poor Organization Kills a Manual

(Continued from Page 29)
This is an exaggeration, of course. The best manuals I have ever seen were written by programmers who were describing their own work. Still, it is not far off base. Programmers get uncomfortable when they have to talk about the forest instead of describing each tree.

End-User Reaction

End users are easily overwhelmed by such manuals. They want to know what goes in and what comes out. They don't care how many programs are executed in between.

A good end user's manual may well be three or more manuals. Volume 1 is for the data processing liaison group. It contains technical information and run schedules.

Volume II has data entry instructions. It contains full information for a key punch operator.

The remaining volumes are output-oriented. There will be one volume for each distinct group of users.

The table of contents may be little more than a list of screen displays and reports. Each section shows the reader what a

report looks like. It tells the user how to get the report, what data is included, and where the data came from.

The user should have no need to refer to any other section for information about that report or display.

All of which proves that end users are no different from systems people. They want manuals oriented to their work.

In the end, it shouldn't matter who does the writing. The organization must reflect the job needs of the reader. And if there is more than one reader, it may be necessary to have more than one manual.

Rigo is president of Sysdoc, Inc. in New York.



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For example, if you compare an STC 4500 with today's streaming tape devices, there's no comparison at all. In data mode, a streaming tape will typically transfer data at a rate of about 20 kb per second, while the STC 4500 offers a data rate of 468 or 780 kb per second. When you use the STC 4500 to backup a high-

rmance disk, it outperforms 8600-type es (see chart below) by a factor of six is. If you consider total time, this

one. If you consider total time, this spands to a differential of eight to one, and with 3410 subsystems, the difference almost nine to one. In sum, the STC 4800 naises frequent disk backup a realistic and cost-efficient alternative — no matter our workload — and at your convenience. Equally important, the 4500 subsystem iso offers enhanced read/write reliability, lears who move from non-STC 1600 pi (PE) to STC 6250 bpl drives and who take advantage of GCR blocking can essonably expect an increase in megabytes rocessed per soft failure of 30 to 35 mes that of PE, and an increase in pigabytes rocessed per hard failure of 18 to 20 times.

Octaged ownership costs.

Older, 3420-type tape subsystems delay open and performance in certain applications but their price/performance ratio falls far short of that which you'd expect with a 4300-based system. In comparisor the 5TC 4500 — like a 4300 processor was designed for use in any office environment. As you can see from the accompanying chart, this means a reduction

of 40% or more in specs, power, and air conditioning costs, and eliminates the need for raised flooring entirely. And in this age of spiraling inflation, this can be an important long-term consideration

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STCs new 4500 tape subsystem can be diagnosed either on-site or remotely. In either event, if one 4500 drive goes down, it can be diagnosed in-line, and

serviced off-line without affecting the re-mainder of the subsystem's operations. Powerful, built-in diagnostics also help assure enhanced data availability. In assure enhanced data availability. In fact, the STC 4500 has microprocessorbased diagnostics designed to make fault isolation faster and more effective by permitting the subsystem to be exercised inline. And special "wake-up" diagnostics will exercise the memory, microprocessor, and interface at power-up to assure proper operation.

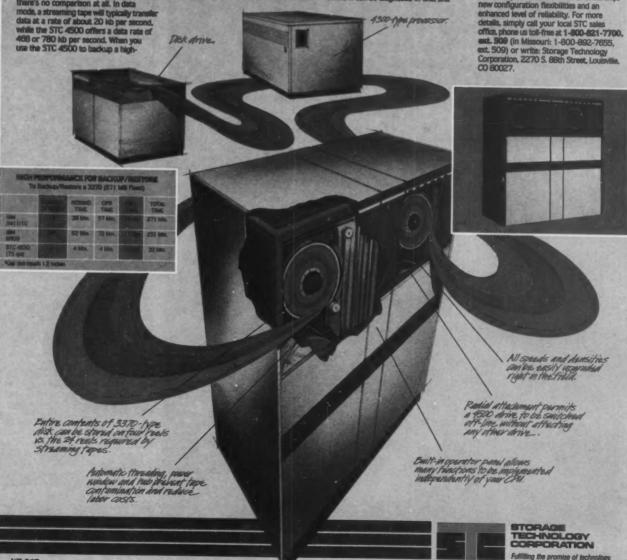
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John J. Connell

Union Climate

It is the very situation in "The Gravy Train Derails" [CW, Nov. 10] which will foster a climate attractive to union organizers. The cases of unionization as typified by the situations at Western Airlines and the Union Pacific Railroad are isolated instances of unionization and very situational.

The issues expressed in "The Gravy Train Derails" have timeliness. Although the software industry may be currently in a time of uncontrolled growth, this growth, like inflation, cannot go on forever. With the development of turnkey packages, promulgation of ideas such as the "IBM Information Center" concept, and the demystification of the function of programmers, the programmers still left in the industry five to 10 years from now may look to means of protecting their function through legal mandating of

ETTERS

an employer-employee relationship -

Now is the time, before the train actually derails, for programmers to give thought to what they actually do and how it will fit into the industry five to 10 years from now. Perhaps Peter Drucker's conception of computer programming as semiskilled work has

As some clerical jobs are being replaced by computers, so may generalized software packages and data bases accessed with user-oriented languages replace many programmers.

Elizabeth A. Davidson

Los Angeles, Calif.

'They' Are Us

David F. Stevens' article "The Menace of Micros" [CW, Nov. 3] was excellent — a thought-provoking treatment of a subject that is usually ignored in our zeal to introduce computer technology into business operations. We have gone ahead blithely with the development of computerbased systems that use terminals for access. Seldom is consideration given to how the systems affect those using the terminals.

We are now on the threshold of the office-of-the-future, in which other terminal-based technologies will be introduced into our lives - electronic mail, computer conferencing, data

base retrieval and the like. While terminal users on computer-based systems tend to be lower ranking personnel, the newer technologies are aimed at the managerial and professional work force. How this group will react to these new technologies, how their behavior and modus operandi will change and, ultimately, what kinds of human beings they will become are questions of extraordinary impor-tance, because "they" are us. I commend Stevens for his foresight

and Computerworld for publishing his article.

Pasadena, Calif.

Missed the Point

Regarding William Hansen's commentary "The Silencing of a Computer Room" [CW, Nov. 17], he has missed the point completely. There is a right way and a wrong way to do things, and the computer operator definitely chose the wrong way.

As a data processing manager, I would have agreed with the systems and programming manager, but for different reasons. Computer operators should not be allowed to modify a program or JCL indiscriminately. These modifications go against all auditing and control principles. If Poppapills internal auditors had discovered that a computer operator was modifying JCL, they would have the right to crucify the DP manager.

The systems and programming manager was wrong in not evaluating the new procedure just as Hansen is wrong in making his snide comments about a college education. However, the computer operator could have put his suggestions in writing and let his manager handle the proposed modifi-

As for the operator being fired for running his system after he was told not to, that is insubordination and if left unchallenged would lead to anarchy. Right or wrong, when senior management in or out of DP, makes a decision, it is to be followed. If you don't want to abide by the decision, leave before you have an involuntary termination on your record.

Harold Steintrager

Los Angeles, Calif.

Classic Lament

Robert Glass's article, "Management Enters the Garden of Eden" [CW, Nov. 24] is an entertaining fable. But it is just another version of the classic lament of detail workers everywhere: 'Do you want me to do the work, or do you want me to make out reports?"

The answer from management, of course, has to be, "We want you to do both. We're running a business — not a hobby center. And part of your job is

to help us keep score.

Whether you're a programmer or a plumber, if you're on somebody's payroll, that somebody must find ways of keeping track of the detail work flow and detail costs in all areas of the business. If a plumber is expected to complete the work order and write down the materials used, it's because that's the most cost-effective way to collect that data.

Is it illogical to expect a programmer to be at least as articulate in estimating, recording and reporting his progress in applying his particular skills?

Charles J. McDonough



NEW YORK - A Line Utilization Control Inquiry (Luci) system designed to measure live performance in a CICS envi-ronment has been introduced by Analysts

International Corp.

By calculating the dates and traffic—
the number of bytes transmitted for a selected line—for a specific time interval, a ratio is calculated that represents line util-

ization, according to the firm.

Such data is said to be helpful in establishing the causes of performance degradation, such as traffic overloads at specific time intervals, inefficient programming techniques that transmit more data than is required and application systems that have especially high fluctuations in message rates.

The results may be displayed at a terminal for immediate review, at a printer for later review or for comparative analysis with other time intervals

Luci runs under the IBM 370 OS environment with CICS/VS and Basic Mapping support. Luci transactions are de-

signed for 3270-type terminals. Basic Luci costs \$9,500 per site with a \$1,000/site annual maintenance fee. Basic with Data Compression costs \$14,500 per site, with a \$1,500/site annual maintenance fee. The firm is located at Suite 930, 295 Madison Ave., New York, N.Y. 10017.

Utility Supports CICS Mapping

TULSA, Okla. - DBC Information Systems, Inc. has developed a utility program said to produce Basic Mapping Support (BMS) map set definitions and copy groups

for CICS programmers.

The CICS map and copy group generator is said to eliminate the following steps in generating BMS mapset definitions: determining field locations, calculating field lengths and specifying field attributes and edit requirements.

To use the utility, the programmer designs the screen layout and provides names for the fields to be accessed by Assembler, Cobol and PL/I programs.

In one step, the generator produces the BMS statements for input to the assembler and creates copy groups for all the languages specified. Multiple maps can be generated for each mapset by supplying additional screen layouts and field names.

The utility runs under DOS and OS in less than 64K bytes of memory and costs \$500 for source code documentation from Box 33020, Tulsa, Okla. 74135.

VAX Machines Get 'Ingres': C-Based Relational DBMS

BERKELEY, Calif. - Relational Technology, Inc. (RTI) has introduced a relational data base management system (DBMS) for Digital Equipment Corp. VAX-11/780 and VAX-11/750 computers running under

Ingres includes the following facilities: · Commands to define logical and physi-

cal data bases.

• Quel - a query language designed for interactive data manipulation.

• Equel — a precompiler for query language statements embedded in the C pro-

e Tools required to define views of the data base, specify protection predicates and assert integrity controls. · Utilities designed to load and unload the

data base and to assist in crash recovery. · An internal editor to support interactive

An Ingres data base consists of a set of tables, or "relations," each of which can hold a maximum of 50 fields, according to an RTI spokesman. The tables can have a record width up to 2K bytes.

Valid field data types are 1-, 2- or 4-byte integer. 4- or 8-byte floating-point or a

fixed-length character string of up to 255 bytes, he explained.

The data base is essentially created through four commands. CREATDB names the data base and sets up a skeletal directory, CRE-ATE defines each relation within the data base, COPY fills each relation with values sorted on a disk file and MODIFY organizes the storage structures of the relations

Once a relation is defined, its values can be loaded through either the COPY command or the Quel language insertion facility, the RTI representative noted. He justified the description of Quel as a nonprocedural language by noting that the user specifies which set of records is to be accessed, but is not required to provide the algorithm reguired to obtain them.

Quel is available interactively via terminal monitor software or from a host language. The only host language currently being sup-

Requiring a minimum of 256K bytes of main memory, Ingres will be available Jan. 1 for approximately \$30,000. Additional in-formation can be obtained form RTI at 2212 Eunice St., Berkeley, Calif. 94709.

Three ASI Courseware Modules Provide CAI for DP Training

CHICAGO - Computer-assisted instruction (CAI), which is usually associated with end users, has come home to roost with Advanced Systems, Inc.'s (ASI) introduction of CAI "courseware" for DP-related education and training. The announcement was made here at ASI's recent training conference.

The initial CAI release will include three educational series.

One, which covers approximately 20 course units, offers simulation capability to computer system opprators in such areas as JCL, Time-Sharing Option (TSO) and JES2.

Another series was designed to allow students to reinforce skills developed in videoassisted instruction courses through a series of tests. It covers some 130 DP-related course units, ASI noted.

The third group is essentially a placement tool for the DP training manager. It provides for quantification of the skills level of any given student. This capability supposedly makes it easier to place the student at the appropriate level of a course or curriculum.

Requiring an IBM operating environment that includes IBM's Interactive Instructional System (IIS), CAI courseware is perceived as a natural addition to existing textual, audio and videotape instruction.

Included in the offering is a monitor program that produces a series of reports.

The minimum tape-month contract allows 360 tape-months in one year at \$85/tape-month, the vendor said.

ASI is headquartered at 2340 S. Arlington Heights Road, Arlington Heights, Ill. 60005.

'Total' Users Get Documentation

AUSTIN, Texas - Gunter & Associates; Inc. has announced a Structured Documentation System for IBM installations using Cincom Systems, Inc.'s Total data base management system.

The system is said to track the relationships of programs to systems, systems to programs, programs to files, reports to users, users to reports, source documents to users, users to source documents and source documents to data entry formats.

A perpetual license for the Corporate Information Documentation Control System costs \$21,800 from Gunter & Associates, Suite 111, 3636 Executive Center Drive, Austin, Texas 78731.

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'Tars' Gets Upgrades

McLEAN, Va. - Johnson Systems Inc. has announced upgrades to its Job Accounting Report System (Jars), including four additional reports to its working set.

Jars is comprised of a report genera-tor, data management utility, data set spool utility and the \$JOBACCT interface routine. Included in the enhancement are Johnson-supplied paging modifications for DOS/VSE Release 2, support for Power/VS Account Files from a shared pool environment and longer RJE (type T) records created by DOS/VSE

lars Version 4.1 costs \$4,000, and a Power/VS interface costs \$2,000 from the firm at 7923 Jones Branch Drive, McLean, Va. 22102.

Formerly Time-Shared Service

'Pbar' Gives Patient Billing on ARC System

LOS ANGELES - The on-line, in-teractive patient billing and insurance form preparation system currently offered as a time-shared service under the Datapoint Corp. Attached Re-source Computer (ARC) system is now available as a software package from Data Care Systems, Inc.

The Patient Billing and Accounts Receivable (Pbar) system reportedly utilizes formatted video displays to enter and edit data and to inquire to the patient master and transaction history

Pbar utilizes the "Profile" technique that allows each user to tailor the system options to its particular needs concerning automatic pricing, delin-quency control, and statement and in-

surance forms preparation.
The Pbar software in conjunction with the ARC system allows more than 48 on-line users on Data Care's five-processor ARC system. ARC allows expansion of on-line terminals by 16-terminal increments.

The software costs \$15,600 for the source modules and the Datapoint computers start at \$24,000 for a 10Mbyte system with a printer. Software and hardware are available from Data Care at 2044 Armacost Ave., Los Angeles, Calif. 90025.

Digi-Log System 2000 Gains Four Financial Packages

HORSHAM, Pa. - Digi-Log Systems, Inc. is offering four financial software packages for its System 2000

desktop business computer.
The Accounts Payable system was

benefits include increased discounts from payments targeted for due dates and a reduction of cash tied up in operating accounts.

The Accounts Receivable system converts excess receivables to cash, while retaining good customer rela-tions, the vendor claimed. It reportedly aids businesses in speeding collections, spots potential losses early and takes corrective action.

The General Ledger system produces compartmental and summary income statements that contain all current and year-to-date amounts and percentages categorized.

The Payroll system controls person-nel costs through departmental totals each pay period and produces monthly summary reports.

Each system costs \$1,250, the vendor said from Babylon Road, Horsham, Pa.

HP Users Get RTE Hot Line

STAFFORD, Texas Hewlett-Packard Co. RTE-based computer systems can now utilize a hot line service number offered by Letts Systems Corp.

For \$150/mo, subscribers can receive advice ranging from recovery assistance to programming tips, for up to five hours per month. Users will re-ceive a 5% discount from field service rates when involvement beyond the five hours per month is required.

Letts is located at 13102 Naples Lane, Stafford, Texas 77477

ADP Boosts Features Of DEC's Fortran 10

ANN ARBOR, Mich. - ADP Network Services, Inc. has developed a modified version of Digital Equipment Corp.'s Fortran 10 that is said to make the language more powerful, more efficient and easier to use.

Some of the features of the new Fortran are dynamic arrays with an arbitrary number of dimensions for all data types, a string data type with complete string-handling capabilities, extended character set and expanded free-format source input statements.

Also featured are array bounds that may be negative or zero, any number of subscripts on arrays, symbolic names for constants, compiler macro definitions, global optimization and enhanced sequential and randomaccess I/O capabilities.

The language is offered as part of the firm's time-sharing services. ADP is located at 175 Jackson Plaza, Ann Arbor. Mich. 48106.



MAIL TO: CW/CBN Books, 925 North Milwaukee Ave. Wheeling, IL 60090 The 1979 issues of the Computerworld and Computer Business News Indexes have, together, more than 100 send me the following Indexes: pages of major headings, minor headings and article titles. All in all there are thousands upon thousands of entries covering everything from ACCOUNTING SYSTEMS (49 entries) to ZIPSORT PACKAGE (1 entry). Look at some of these other headings: Index Price Code # Qui Computerworld \$29.50 WC600 1979 Busiless News \$29.50 WC601 Computerworld \$24.50 WC602 # Entries Computerworld \$19.50 WC603 CBN FLOPPY DISKS 20 1976 (last half) CW \$14.50 WC604 WORD PROCESSORS CBN All Computerworld Indexes DIGITAL EQUIPMENT CORPORATION CRN 100 \$75.00 WC605 47 CBN MEMORIES Add \$1.25 shipping and handling for one book and 75¢ for each DATA ENTRY SYSTEMS CW additional book. If your check is enclosed, we pay shipping cost CW LITIGATION 35 CW MAINTENANCE 15-Day Free Trial! I may read the Indexes for 15 days, and, if not satisfied, return them, and you will return SIMULATORS AND MODELLING CW PROGRAMMING AIDS ☐ Check enclosed ☐ BAVisa ☐ MC Date___ And that's just a small sample of the type of informa-tion you'll find in these two books for just one year! We also have Indexes for *Computerworld* that go all the way back to 1976 (the CBN Index starts with the first appearance of CBN in November, 1978 and runs through the end of 1979). If you don't have all the back issues of Computerworld or Computer Business News that you need to get the articles you want, you can order back copies for an entire year on microform from University Microforms at very reasonable rates. Or you can simply take advantage of their individual articles reprint service. (More information is found right in each Index.) Address

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Some say their products are superior. Others prove it.

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If you've been tempted by today's economics to try something other than Graham tape, come back.

You'll find Epoch 480 even better than Epoch 4.

GRAHAM MAGNETICS



Proprietary Software

Panda Systems Packages Fit Medical, Dental Use

Inc. has designed two proprietary software packages for the medical, dental and medical accounting markets: the Medical Practice Management System and the Dental Practice Management

The medical system performs normal recordkeeping and billing functions and maintains information on physician referrals and patient activity. A special coding feature is keyed to the individual fee structures, which re-

Prodigy Adds General Ledger

ISELIN, N.J. - Prodigy Systems, Inc. has added a general ledger package to its accounting software for its small business computer line.

Features of the package include userdefined chart accounts, detail general ledger and summary, instant access to current balance, complete audit trail and the ability to produce comparative statements, the vendor said.

The general ledger package is part of an integrated accounting package that includes accounts receivable, accounts payable and payroll. Prices for the accounting package start at \$12,500, the vendor said from 497 Lincoln Highway, Iselin, N.J. 08830.

their procedures to suit the system

The dental system allows the input of data from a 10-key pad for master account and credit information and handles patient statements, income allocation, cycle billing and multiple fee schedules.

Both systems require a minimum configuration of 64K bytes of main memory and a 10M-byte hard disk and operate under Iris Basic or Digital Equipment Corp. Basic Plus.

The packages, priced at \$6,500 each, have vendor maintenance and software customizing available. Panda Systems is at Suite 518, 7080 Holly-wood Blvd., Los Angeles, Calif. 90028.

DG Minis Get WP Package

OREM, Utah - Satellite Software International is offering a word process-ing (WP) package for Data General Corp. systems.

SSI*WP will run on DG minis under the AOS, RDOS and Icos operating systems. It costs \$5,500 on DG's Eclipse line, \$4,000 on the Nova and \$3 000 on the Micronova

Satellite Software International is at

Prime Series 50, VAX-11/780 Gain Schematic Drawings

FISHERS, N.Y. - Scientific Cal-culations, Inc. has introduced a software package that automatically generates schematic drawings for Prime Computer, Inc. 50 series and Digital Equipment VAX-11/780 CPUs.

The Schemactive program is said to automate the design process, or it can work with the designer by offering computer-assisted designer controlled operations, the vendor

The program comes with "Coach" routines to aid the designer through direct prompting via the dynamic switching of command lists to determine design options or define needed data, the company said.

The package costs \$10,000 for an initialization fee and \$1,100 a month thereafter, Scientific Calculations noted from 7635 Main St., Fishers, N.Y. 14453.

Vector Graphic Micros Get WP, Financial Planning

Word processing (WP) software called Memorite III and a financial planning system called Execuplan have been introduced by Vector Graphic, Inc. for

its family of microcomputers.

Both operate on the Vector Intelligent Partner (VIP) microcomputer, as well as the System B, the 2800 and the 3030; all under control of CP/M 2 op-

erating system

Memorite III offers a built-in quick reference manual that displays answers on command; fastest available editing due to memory capacity of 17 pages without disk access; and fieldaccessible software so that userdefined features can be added as needed, the firm said.

Execuplan is a coordinate-based system for calculating, displaying and printing planning, budgeting and forecasting schedules and for projecting

Data Access Updates Bookkeeping Package

CHARLESTON, S.C. - Data Access Management Service has released the second version of its Basic Bookkeeping System for Ohio Scientific, Inc.

The package consists of general ledger with double-entry bookkeeping, single- or multiple-division companies, data entry and reports. Also in-cluded is a check writer with automatic look-up of accounts, multiitem and multiaccount checks, deposits and bank balance.

The version costs \$2,250 including a 90-day warranty period and 90-day maintenance period; maintenance costs extra after that time, a spokesman said from 3320 Rivers Ave., Charleston, S.C. 29405.

Seven Features Added to 'Personnel/Payroll'

ROCHESTER, N.Y. — Information Associates, Inc. has added seven more features to its Payroll/Personnel pack-

The additions are complete on-line capabilities for customers using IBM's CICS or a similar telecommunications monitor, a job attribute table, a system calendar, automatic vacation and sick pay accruals, user-controlled tax ta-bles, integrated position control and automatic gross amount calculations, the vendor said.

Payroll/Personnel costs between \$50,000 and \$100,000, the vendor said from 97 Humboldt St., Rochester, N.Y. 14906.

profits, sales, shipments, cash flow, costs, taxes or other financial data. Functions for scientific applications are also provided, according to the

In operation, Execuplan presents a video screen look at any selected section of a large electronic "sheet" representing financial entries. The user can title columns and rows as desired and enter formulas and numbers while the program stores data, formulas and results in disk memory.

The two software systems can be integrated. The Memorite III WP software costs \$450 and the Execuplan program costs \$150 from Vector Graphic, 31364 Via Colinas, Westlake

Village, Calif. 91362.

Modcomp Adds Pascal

FORT LAUDERDALE, Fla. - Modular Computer Systems, Inc. (Mod-comp) has added a Pascal compiler to its line of software products.

Modcomp/Pascal meets proposed International Standards Organization (ISO) standards, the vendor said. The compiler is compatible with Modcomp's MAX IV software family and reportedly takes advantage of the firm's Classic such literature. firm's Classic architecture.

The compiler costs \$3,500 including documentation. Modcomp can be reached at 1650 W. McNab Road, Fort

Lauderdale, Fla. 33310.

Corrections

Cincom Offers Interactive Version of ENV-Data" [CW, Nov. 24] contained an error in price and an error in nomenclature. The firm's Total Information Systems software package should have carried the acronym TIS by which it is commonly known. In addition, the ENV-Data facility was said to carry a \$20,000 installation fee for installations with DOS or OS with advanced mapping. The installation fee is actually \$2,000.

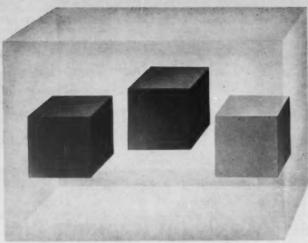
The correct address of Philinda Software ["Utility Aids JCL Operations," CW, Nov. 3] is 527 W. Kerr, Spring-

field, Mo. 65803.

The correct address of the Wollongong Group ["Unix, SCC5 Supported by PE 32-Bit Supermini," CW, Oct. 20] is 960 San Antonio Road, Palo Alto, Calif. 94303.



The Transparent Single System Image Has Arrived!



With the recent addition of the Global Console Director (GCD) to Allen Services' line of software packages for Multiple System environments, an entire complex of systems can now be treated almost as though it were one single unified system.

The complete "unified system" effect is achieved through combined use of three independent (but related) program products. Each of these, Super-MSI, MSM and GCD addresses distinct concerns present in multi-system environments.

Of course, since the products are independent, if you aren't yet ready for the full-blown unified system effect, you only need to select the products which interest vou.

UNIFIED DATA INTEGRITY (including VSAM)



The Multiple Systems Integrity Facility provides the same thorough dataset integrity protection for jobs in different systems that would exist if the jobs were in the same system. In addition to propagating "standard" dataset integrity across systems, Super-MSI also insures that the VSAM "internal" SHR options are honored throughout your entire complex. Effective crosssystem VSAM integrity can be obtained in no other way than through the use of Super-MSI.

Another feature: Super-MSI also eliminates the hardware RESERVE lockouts which are normally inherent with SHARED DASD in multiple system environments.

Much more besides: Super-MSI has many other exciting features including special aids for operators and TSO Users. All in all, Super-MSI will be a very powerful addition to your installation.

UNIFIED DEVICE MANAGEMENT



and MOUNTABLE DISK devices across all systems in yo plex. It allows you to operate normally with all devices ONLINE to all systems. MSM insures that device allocation by jobs in different systems occurs just as if all jobs were operating in one single unified system.

MSM eliminates the operational burden of juggling TAPE and DISK units among systems. It protects against the danger of a system accidently rewinding or overwriting a TAPE in use on another system; this removes the single greatest cause of shared tape mishaps.

MSM will use your TAPEs and DISKs more efficiently - which can result in immediate device cutbacks or (more likely) postponement of future acquisitions.

MSM is so transparent that it can be operated without the use of any new operational commands. Of course, there are powerful new commands available — however these are extras, not

Only MSM allows such truly NATURAL and transparent

Other features (for MVS environments only):

 The MSM Device Preferencing capability allows devices to be dynamically structured into a hierarchy of sets; MSM insures that units in preferred sets are used, wherever possible, before less preferred sets

■ The MSM SOFTSWAPTM feature insures that DDR device SWAPs for TAPE units will NOT impact JOBs or TSO users which are not using tape allocation. Without SOFTSWAP™, TAPE DDR SWAPS are likely to impede all allocations in a - including even those which do not use tape

UNIFIED OPERATOR CONSOLES



The Global Console Director is an extremely flexible tool. It allows (selected) message streams from different systems to be logically "blended" to create a unified system image (to whatever degree desired). In a slightly different vein, GCD allows any console on any system to be logically attached concurrently (and perhaps in different ways) to any set of systems in your

GCD allows commands entered from any console to be directed and processed anywhere in the complex; in this respect, all con-soles are effectively linked to all systems. In almost every aspect, GCD is philosophically and operationally compatible with the standard system console support. GCD can improve overall throughput by simplifying operations. By allowing several physical consoles to be logically merged,

excess devices can be eliminated for immediate savings, or deployed elsewhere to strategic advantage.

GCD is absolutely transparent to your users, and aside from major simplifications, nearly transparent to operations.

If you wish to use more than one of the above products, they can be integrated together into a single control task (thus further reducing overhead and complexity). In nearly every instance where our products have been competitively evaluated aga. 1st all possible hardware or software alternatives— our software has been chosen. Aside from iBM, Allen Services has been providing commercial software specifically designed for multiple system environments longer than any other company. Over 400 major installations throughout the world have already selected our products as the preferable means of handling problems associated with multiple system environments. The number grows daily. Reliability has always been an integral neat of our design. part of our design.

When considering software, most people consider support to be a very important factor — Allen Services has over 200 support personnel.

The only other comprehensive approach to unifying multiple systems is JES3 (or ASP). Aside from the fact that MSI/MSM/GCD can be installed and implemented in only a few minutes, there are several other significant differences from JES3: For example, MSI/MSM/GCD (combined) use only 1% to 2% overhead; MSI/MSM/GCD are invisible to your users; MSI/MSM/GCD were designed to be strictly compatible with OS/VS/MVS philosophies — in this regard none of your personnel will require re-training.

The majority of all eligible multiple system instaliations are now using our products to help

Because installations can have widely different characteristics, you may still have a nagging suspi-cion that our claims may not actually apply to your shop. To alleviate this doubt, we invite you to try our products (whichever ones interest you) at your own installation under your own condi-tions. This trial carries no charge and is without obligation. One word of caution: You're going to like them so much, you'll never take them out.



For more information, call Susan: 800-543-7583 (in Ohio: 513-890-1200) Or write: Software Department . Allen Services Corp.

212 W: National Rd. • Vandalia, Ohio, 45377

Time Series Accessed

ANN ARBOR, Mich. — ADP Network Services, Inc. will offer on-line interactive access to approximately 800 Conference Board time series reports on a variety of business statistics in the U.S.

The time series data base can be accessed via ADP's international teleprocessing network through desktop computers. Features include summary projections of GNP inflation and unemployment, as well as indicators collected by the Conference Board. The Conference Board is a non-profit research organization.

The access feature is billed on an as-used basis, ADP said from its headquarters at 175 Jackson Plaza, Ann Arbor,

Mich. 48106.



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Do you have hands-on experience with computerized manufacturing systems? Then together we can help improve America's productivity!

Our Manufacturing Resource Planning (MRP) systems are now available to manufacturers of defined sizes. For the experienced agent or systems house, we offer territories, a comprehensive marketing program and the best MRP software system on the market. Package includes complete and useable documentation and end-user education. Results will be measured on a quarterly basis against quota.

Please send company history and present product lines to Mr. Ross Trenholm.



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Product Evaluation Aid Offered

ANN ARBOR, Mich. — Comshare has added a product evaluation tool to its time-sharing network.

The New Product Introduction is a cluster of computerized information analysis aids that reportedly support the financial marketing management decisions of clients in the consumer goods and industrial manufacturing business.

The package can be used to test the effects of pricing strategies on a product's contribution margin, the vendor said.

Comshare is offering demonstration seminars on the new product tool in Chicago, Nov. 12, Minneapolis, Dec. 4, St. Louis, Dec. 10, Los Angeles, Dec. 16 and San Francisco, Dec. 17. The New Product Introduction tool is billed on an asused basis, the firm said from 3001 S. State St., Ann Arbor, Mich. 48106.

Windfall Tax Tool Bows

ANN ARBOR, Mich. — Computer Research Co. (CRC), a subsidiary of Comshare, Inc., has added a windfall profits tax calculation package to its time-sharing services.

Developed by Coopers and Lybrand, Inc., the package provides accounting, reporting and recordkeeping procedures for handling windfall profits taxes, the vendor said.

The package is available on CRC's time-sharing system and is billed on an as-used basis.

Comshare is located at 3001 S. State St., Ann Arbor, Mich. 48106.

With 400 Weekly Time Series

Citibase-Weekly on Rapidata Net

FAIRFIELD, N.J. — The Citibase-Weekly data base of money supply statistics from Citibank is available on Rapidata, Inc.'s nationwide computer system.

The data base will contain approximately 400 weekly time series. Among items included are currency exchange

rates for 16 major countries; the Bureau of Labor Statistics' spot market price indices for 22 commodities; weekly prices for hard and soft commodities, and key production data for coal, electrical power, paper, paperboard, steel, passenger cars and petroleum.

The subscription cost for the

data base is \$130/mo if used alone, or \$100/mo if used in conjunction with the Citibase data base. The charge is in addition to Rapidata's standard computer service costs.

dard computer service costs.
There is a \$100 start-up fee for new customers, the vendor said from 20 New Dutch Lane, Fairfield, N.J. 07006.

Tsam' Gains 30 Additions

ANN ARBOR, Mich. — A version of the Time Series Analysis and Modeling System (Tsam) featuring over 30 new commands and options has been announced by ADP Network Services, Inc.

Expanded graphics capabilities that include automatic curve labeling, footings,

stacked bar charts and vertical line plots, automatic positioning of multiple plots and horizontal and vertical axes lettering options can be utilized without need for programming graph set-up files, data files or product linkage, as was true of past Tsam releases. In addition to the graphics enhancements, the new Tsam offer features an "Auto Repeat," which repeats time series values; "Roll Command," which shifts the current date range forward and backward; and a "Dictionary" subsystem that helps users identify time series of interest, an ADP spokesman explained.

Prices for the updated version of Tsam are based on connect hours and computer resource units with typical applications ranging from \$500 to \$2,500 monthly.

More information can be obtained from Lawrence Rafsky, ADP Network Services, 175 Jackson Plaza, Ann Arbor, Mich. 48106.

Dow Jones Adds Text Search To News/Retrieval Service

NEW YORK — Dow Jones & Co. is adding free text search and information retention over a longer period to its computerized News/Retrieval Service, which provides business and financial news on command through timesharing terminals or personal computers.

Free text search will enable News/Retrieval Service subscribers to search for and retrieve news and information using words that are contained in the text of stories stored in the data base, a spokesman explained. Users will continue to be able to retrieve stories by company stock symbols and various industry and government agency categories, a Dow Jones spokesman said.

Free Text Search

The standard free text search software from Bibliographic Retrieval Services, Inc. of Scotia, N.Y., will be used.

Stories will be able to be retrieved as far back as 15 months initially, the firm said. Dow Jones can be contacted at 22 Cortlandt St., New York, N.Y. 10007.

Air Crash Data Base Debuts

TORONTO — I.P. Sharp Associates is now offering details on aircraft crashes and accidents on-line in over 300 cities through its time-sharing network.

Using its statistics, Sharp can provide an analysis of a major crash in one minute, the vendor claimed, adding that in the past, a full day was required. The data base contains factual information on all jet and turboprop airliner losses for aircraft of 2,000 pounds or over.

The data base is priced according to amount of computer time used.

I.P. Sharp Associates is located at 145 King St. W., Toronto, Ont. M5H1J8.

McAuto Markets Fluid Flow Tool

ST. LOUIS, Mo. — A program that analyzes fluids under pressure is now available from the remote computing network of McDonnell Douglas Automation Co. (McAuto).

The Fluid Analysis and Simulation Technique (Faast), program is owned by GCN/-Hydronet Services and solves fluid flow problems in such systems as fire sprinklers and domestic water distribution.

Faast can be processed in either batch or interactive timesharing modes on McAuto's Control Data Corp. Cyber computers. Costs vary depending on the computer time used:

McAuto is located in St. Louis, Mo. 63166.

With Nine Subsystems

On-Line Business System Runs on HP 3000

MINNEAPOLIS - Corporate Support Systems (CSS), a comprehensive on-line real-time business software system that combines standardized packaging with customized applications, is being introduced by Technaly-

Developed on the Hewlett-Packard

Co. HP 3000 and written in Cobol, CSS consists of the following nine subsystems: order entry, inventory, purchasing and receiving, sales analy-sis, payroll, general ledger, accounts payable, accounts receivable and fixed-asset accounting. The user may install any or all of these subsystems.

daily business information and call up a full range of reports using ordinary English terminology, the vendor said.

CSS Subsystems

All subsystems under CSS - no matter what the combination or sequence are logically linked so that a data item that affects other information is automatically carried through to the relevant functions. Thus, a data item need be entered only once, saving time and reducing errors, according to the

The complete CSS package costs \$40,000 from Technalysis Corp., 6700 France Ave., S. Minneapolis, Minn. 55435.

Datasystem 500 Gets 'Indent'

MERRIMACK, N.H. — Digital Equipment Corp. has introduced a forms management software package called Indent for its Datasystem 500 series of processors.

The package runs under PDP-11 Cobol, Basic-Plus-2 and/or Dibol-11 programming languages and provides an independent data entry front end to business application programs, the vendor said.

Indent can be used in both single and multiterminal applications and sup-ports RSTS/E operating system, version 7 or the CTS-500 operating sys-

Licenses for Indent with full support start from \$2,700, the vendor said from DEC, Maynard, Mass. 01754.

Structured Analysis Workshop **Focuses on Logical Modeling**

NEW YORK - Yourdon, Inc. has introduced a five-day advanced struc-tured analysis workshop concentrating

mainly on logical modeling.
The workshops are given three times a month, Monday through Friday, at

Yourdon's offices throughout the U.S. and cost \$850 per person. Registration details are available

from Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Astra 205 Gets **Four Packages**

LEXINGTON, Mass. - NEC Information Systems, Inc. has announced four turnkey business-application packages for the firm's Astra 205 small business system.

The packages - accounts payable, accounts receivable, inventory control and text processing — are aimed at small businesses with annual sales in the \$500,000 to \$10 million range.

Astra Turnkey systems start at \$8,500, the firm said from 5 Militia Drive, Lexington, Mass. 02173.

Ontel Enhances 'Dear' Packages

WOODBURY, N.Y. - Ontel Corp. has enhanced its Data Entry and Retrieval (Dear) software packages with three features: Dearform, Dearfile and Deardata.

Dearform is used to create a form which can be used in an Ontel OP/L application program directly on the display screen. Dearfile performs data entry and retrieval functions using the forms created by Dearform, and Deardata provides added entry and re-trieval functions, the vendor said.

The three packages are free to licenses of OP/L, a spokesman said from 250 Crossways Park Drive, Woodbury, N.Y. 11797.

Analysis Aided For CAD/CAM

BURLINGTON, Mass. - Applicon, Inc. and Structural Dynamics Research Corp. (SDRC) have jointly announced a software package called Applicon/SDRC Mechanical Design Library Interface, which reportedly enhances finite element analysis techniques by speeding and simplifying model generation.

The package enables analysis results to be translated into graphical data for display on the Applicon computer-aided design/computer-aided manu-facturing (CAD/CAM) system, the vendor said.

The software costs \$25,000 from Applicon, 32 Second Ave., Burlington, Mass. 01803.

DOS/VS(E) and CICS/VS

SYSTEMS PROGRAMMING CONSULTING

CONSULTANTS: Bennett I. Moyle, 4355 Lyndale Ave. So., Minneapolis, MN 55409 612-822-2661.

Steven W. Huggins, 10317 Cherryview Ct., Oakton, VA 22124 (Wash.D.C.) 703-281-0222.

EXPERIENCE:

Each consultant has 10+ years experience in DOS/VS and VSE systems programming in multiple-CPU environments. Specific experience includes DOS/VS and VSE and CICS/VS system generation, performance measurement, control program modifications, equipment evaluation and implementation, various conversions, audio-response, SDLC (VTAM), VM/370, most commonly used software products, 3270 terminal printers, including graphics systems, software development for vendors.

RATES:

\$300 per day (fixed fee available) plus transportation expenses. Telephone consulting

PROGRAM PRODUCTS

Thirty-day free trial available on all products. Full documentation available on request.

BIMSPOOL - DOS/VS(E) Terminal Printer Spooling Retrieves print output from POWER/VS queue and prints it on 3270-type terminal printer via CICS/VS or SHADOW II, effectively providing support for terminal printers to POWER/VS. May be used to eliminate RJE printers.

- Display terminal printer queue and printer status
 Start and stop printer task
 Respond to forms change message
 Altering job output disposition, priority, copy count, or RJE ID
 Deleting job output from queue
 Restarting, repositioning, or flushing current output

PRICE: \$4,000 or \$200/mo

BIMDSLOG-DOS/VS(E) Console Hard Copy File Display

BIMDSLOG displays console messages from the DOS/VS(E) console hard copy file on a 3270-type CRT via CICS/VS or SHADOW II. It may be used:

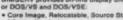
- By computer operators, to redisplay console messages without tying up the console CRT and therefore the entire DOS/VS system.
 By systems and programming personnel, to review console messages without interfering with computer operations of requiring printing of console output for every job.

Conside messages for all partitions, or for specific partitions only, may be displayed. A character string may be specified which will be used to search the file for a starting position. Displaying may be performed in either forward or backward

BIMDSLOG reads multiple blocks per I/O on both CKD and FBA drives for optimum performance and response.

PRICE: \$720 or \$36/mo

BIMSERV-DOS/VS(E) Library Display BIMSERV provides on-line display under CICS/VS or DOS/VS and DOS/VSE.



- Disk VTOC's. Unused areas are also shown

Both system and private libraries may be accessed. Libraries and VTOC's to be accessed are dynamically assigned if necessary. Library directories may be partially displayed using a generic name capability to search for entries beginning with the same charácters.

PRICE: \$1,480 or \$74/mo

BIMMONTR-DOS/VSE System Status and POWER/VSE Queue Display

BIMMONTR includes several functions oriented toward systems programmers, operations, and programmers:

- tems programmers, operations, and programmers:

 Displays internal system performance variables such as paging rate. CPU utilization, channel queue utilization, etc.

 Displays current POWER/VSE queue entries

 Displays current POWER/VSE queue entries

 Displays contents of job entries in the reader, print, or punch queue. Entries may be scanned forward or backward, or by searching for a character string.

 Alters queue entries by passing a user-entered command to POWER/VSE

The program may be automatically initiated at a user-specified frequency, which is often used by operations to dedicate a CRT to providing a POWER/VSE queue display.

BIMMONTR is based on the "world famous" DOSMONTR system, with over 300 users worldwide, it uses a 3270-type CRT under CICS/VS and supports POWER/VSE on both CKD and FBA disk using high-speed I/O techniques.

PRICE: \$920 or \$48/mo.

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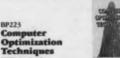
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Migrates to IBM Hosts

Switcher Makes Bank's Change Easier

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PITTSBURGH, Pa. — An intelligent message-switching system is credited with helping a \$1.4 billion savings bank here complete migration from a dual Honeywell, Inc. 3200 central host system to a dual IBM 3031/3705 host system.

Dollar Savings Bank's switching system permits input messages to be routed to one or both central host systems on the basis of message content. Since application areas are defined by transaction code/account prefix combinations, a given application area is routed to both host systems while all other transactions are routed to one host only.

The routing function permits a controlled approach to program verification on the new central host and also allows Dollar Savings to gain the new system's benefits as soon as possible.

The bank's message-switching system was implemented on a Tandem Computers, Inc. T/16 Nonstop computer system by Pittsburgh-based Midec, Inc. The T/16 consisted of four processors, each with 384K bytes of solid-state memory, and two 64M-byte formatted disk drives configured as mirrored volumes with removable packs.

The system also included one 9-track magnetic tape drive capable of 800- and 1,600 bit/in. transfers, a programmer's CRT terminal, a 300 char./sec console printer and 68 asynchronous communications ports.

Redundant Hardware

According to Midec engineering vice-president Joseph C. Lombardi, the Tandem T/16 Nonstop features redundant hardware to the modem level and switches messages to backup circuitry in the event primary components fail. To minimize the route-through delay, Lombardi said, the processing load was equally distributed among the

four processors.

A failure of one CPU resulted in the distribution of its processing load among the remaining three processors, Lombardi noted.

For the final systems test phase of the conversion to a dual 3031/3705 configuration, jobs were run in parallel on both IBM hosts to see if one host's performance trailed the other's. The

quadruple-processor Tandem system, acting as a message switch, provided a selective logging capability that eased isolation of problem areas, Lombardi stated.

Also, this system compared responses from the hosts and reported mismatches.

Switching parameters were defined in a Route Translation File indexed by transaction code and account prefix. The programmer/operator reportedly had no trouble changing parameters in the route file with a formatted CRT program dedicated to file maintenance.

The message switching system assigned new account numbers for new account transactions, Lombardi continued, to maintain data synchronization between

(Continued on Page 42)

In Packet-Switch Architecture

Net Tool Ties Perkin-Elmer 3200s

ORLANDO, Fla. — A networking tool for Perkin-Elmer Corp. 3200 series minicomputers is available from Transaction Data Systems, Inc.

Called NNF32, the product is a networking control task that interfaces with Perkin-Elmer's O532 and ZDLC protocols to provide a complete packet-switching architecture between multiple Perkin-Elmer systems, the vendor said.

Features reportedly include multiple precedence levels, data encryption and Datagram and logical connection modes of operation.

An adaptive routing mechanism allows ring network architectures without user or network manager concern for building or maintenance of routing tables, according to a spokesman.

Adaptive routing may be disabled for star network architec-

NNF32 is a subset of Transaction Data Systems' Netrol system. The complete Netrol supports terminal emulation and offers a variety of terminal support, including foreign terminal access to Perkin-Elmer's Reliance transaction processing system, the spokesman said.

The total NNF32 package, including source code, has a single-CPU one-time license charge of \$3,000. Discounts on multiple-CPU licenses start with the third license.

Installation support is available,

the Transaction Data Systems spokesman noted from Suite 210, 5750 Major Blvd., Orlando, Fla. 32805.

Unit Expands KSRs' Roles

ARVADA, Colo. — Henriksen Data Systems has released Comm Center 1. a communications device that allows any keyboard send/receive (KSR) terminal to communicate via TWX, telex or telephone lines.

Features include a nonvolatile keyboard, keyboard dialing and 4K bytes of expandable memory. The basic Comm Center 1 can be custom-programmed to the needs of large- or small-volume users, Henriksen noted. An optional Bell 212A direct distance dialing feature allows messages to be transmitted or received four times faster than at the standard 300 bit/sec rate.

The unit costs \$1,995. Henriksen is located at 6064 W. 55 Ave., Arvada, Colo. 80002.

After Telpak?

GREAT NECK, N.Y. — Anticipating the elimination of interstate Telpak slated for later this year, Network Analysis Corp. (NAC) is offering users of the service a repricing study that examines the costs of employing alternative private-line tariff offerings of AT&T and six specialized common carriers.

The user need only provide NAC with a listing of its circuits, preferably in machine-readable format, the vendor said. NAC will then create a computerized network data base and apply its Net-Trak software program to

the task of repricing the network. The repricing will be based on any one or any combination of the following tariffs: MPL, AT&T wideband, RCA American, MCI Communications Corp., Southern Pacific Communications Co., American Satellite Corp., U.S. Transmission Systems, Inc. and Western Union.

With results available in "a few weeks," a network of 700 Telpak circuits could be repriced under the MPL tariff for about \$5,000.

NAC is located at 130 Steamboar Road, Great Neck, N.Y. 11024.

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IBM 3276-Compatible Station Out

SALT LAKE CITY, Utah — Beehive International, Inc. has announced a control unit display station that emulates a stand-alone IBM 3276-2 control unit display station. The DM 3270 features IBM 3270 protocol compatibility and an IBM 3276 look-alike keyboard with a 12-key numeric pad, 24 program function keys and a double-

then stored in random-access

The price for the unit is \$1,395, the vendor said from

7401 Central Highway, Pen-

nsauken, N.J. 08110.

Datamedia Adds Printer

memory

PENNSAUKEN, N.J. — Datamedia Corp. has unveiled an 80- and 132-column terminal featuring regional smooth scrolling, split screen and double-high/double-wide characters.

The DT80/3 has features found in the Digital Equipment Corp. VT 100. It emulates several popular terminals, including the Hazeltine Corp. 1420, the Applied Digital Data Systems, Inc. Regent 25, the Lear Siegler, Inc. ADM 3A and the Datamedia Corp. 1521A, a Datamedia spokesman said.

From the keyboard, the user can select compatibility modes that emulate the four terminals. He chooses the desired mode from a menu displayed on the screen, and the mode is

System Aids CPU Switch

(Continued from Page 41) the two IBM hosts.

Dollar Savings' on-line banking network consists of 150 data terminals connected to 30 remote concentrators multidropped over 10 leased private lines. An asynchronous IBM 2260 poll/select protocol was used to communicate with all remote concentrators, Lombardi pointed out.

This on-line network is now undergoing a major expansion expected to include state-of-the-art teller and automated teller machine equipment, Lombardi added.

Midec is engaged in developing a generalized message switching system that will include the ability to switch or store and forward entire files of information or individual messages (financial transactions when the application is banking).

The Midec system, based on at least two Tandem T/16s with 384K-byte main memory each, is now said to support the following communications protocols: IBM binary synchronous, Synchronous Data Link Control, High-level Data Link Control, IBM 2780/3780 Remote Job Entry, Hasp Workstation, Tinet, IBM 3747 emulation and asynchronous IBM 2260.

Other supported protocols include IBM 3270, Burroughs Corp.'s multipoint asynchronous and ADM-2 multipoint asynchronous.

Midec's address is 267 Kappa Drive, Pittsburgh, Pa. 15238. buffered print capability to enhance printer throughput. The unit is also said to allow

The unit is also said to allow use of a low-cost Ascii serial printer as a replacement for the IBM 3287 buffered printer. The printer is supported via the asynchronous RS-232C port and offers switch-selectable speeds up to 9,600 bit/sec.

The DM 3270 costs \$2,395 from Beehive at 4910 Amelia Earhart Drive, Box 25668, Salt Lake City, Utah 84125.

Lanier Gets 3270 Option

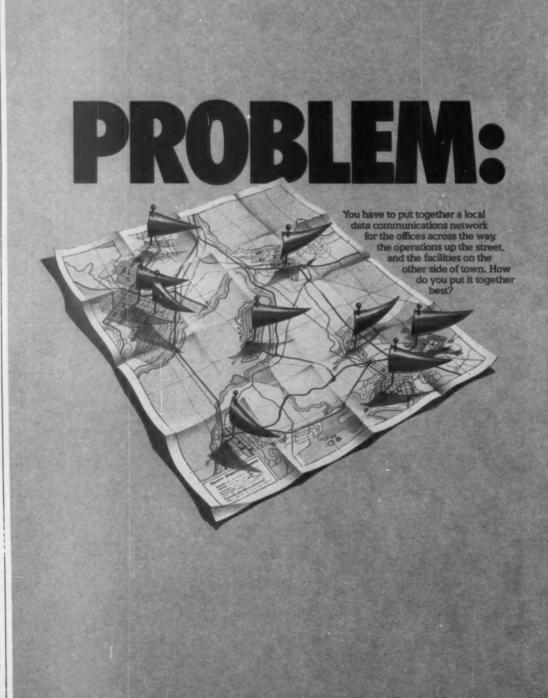
ATLANTA — Lanier Business Products, Inc. has announced an IBM 3270 data communications option for its No Problem typing system that allows those typing systems to be used in almost any communications network to retrieve stored data from central CPUs.

The option consists of a printed circuit board and applications software that can be inserted into a No Problem typewriter to give communications capabilities.

The option costs \$3,270 and is available in a bisynchro-

The option costs \$3,270 and is available in a bisynchronous version. An IBM Systems Network Architecture/-Synchronous Data Link Control-compatible version will be available in March.

Lanier is at 1700 Chantilly Drive N.E., Atlanta, Ga.





The Teletype 4420

Detached Keyboards Available

Teletype Adds CRT Terminals

SKOKIE, Ill. — Teletype Corp. has unveiled two more members of its communications product line in the form of keyboard CRT terminals. The Teletype 4420 and 4543 use LSI technology and are available with detached keyboards and optional character and line printers.

The 4420 is a multipurpose buffered keyboard display. The asynchronous point-to-

point terminal features character or block transmission, speeds up to 9,600 bit/sec, three-screen memory and buffered printer port.

Function Keys

With full editing and formatting capabilities, keyboardselectable options, cursor XY addressing and readout, the unit also offers programmable program function keys, destructive scrolling and built-in diagnostics. Depending on type, printers can be located 50 ft or 2,000 ft from the display

The Model 4543 Single Display Terminal complements the firm's 4540 clustered terminal system and features stand-alone operation for access from remote locations where the traffic load would not justify a clustered system.

The 4543 operates at up to 9,600 bit/sec over non-switched point-to-point or multipoint private-line systems using a bit-oriented synchronous link protocol.

The 4420 with standard keyboard costs \$3,824, and the 4543 costs \$4,731 from Teletype Corp. at 5555 Touhy Ave., Skokie, Ill. 50077.

Two Bantams Join PE Line

FLANDERS, N.J. — The Terminals Division of Perkin-Elmer Corp. (PE) has introduced two more members of its Bantam CRT family, the Models 550S and 550E.

The microprocessor-based Model 5505 is a block mode/editing CRT unit. Its three different modes are optimized for conversational time-sharing, transaction processing and text manipulation of software development.

The 550S offers an optional second page of fully scrolling memory. The 24-line screen acts as a movable window into 48 lines of 80 columns of memory.

In transaction processing mode, the optional second page can store a second page of the form, which is called up automatically when the operator tabs off the first page, PE

Standard Model

The standard model has 83 keys, including a multifunction numeric pad and four (shiftable to eight) program function keys.

The Ascii serial printer port is standard, as is "XON/-XOFF" host control over terminal block transmissions and field attributes for half intensity, blink, nondisplay and protected, according to a spokesman.

The Model 550E offers a standard dedicated keypad for numeric entry and cursor movement. It is driven by a custom LSI chip and 19 integrated circuits.

The 550S costs \$1,189 and will be available in February. The 550E costs \$1,016 with availability in January.

PE's Terminals and Customer Service Division, is located at 360 Rt. 206 S., Flanders, N.J. 07836.



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CRT Terminal Has Smart Features

ANAHEIM, Calif. - A lowcost conversational CRT terminal said to offer features traditionally available only on smart terminals has been introduced by Lear Siegler, Inc.,'s Data Products Divi-

The ADM-5 Dumb Terminal provides reverse video, reduced intensity and reverse video/reduced intensity: limited editing capabilities; and a gated extension port for selective transmission of data from the terminal to any serial RS-232C peripheral.

Priced at \$995, the terminal operates asynchronously in half- or full-duplex modes at any of 11 data rates from 75to 19.2K bit/sec, a company spokesman said.

Up to 32 control char. may be transmitted to the computer and/or entered on the display screen. The Data Products Division is located at 714 N. Brookhurst St., Anaheim. Calif. 92803.



The ADM-5 Dumb Terminal

IDS Dot Matrix Printer Gives Letter Quality

BOSTON - Integral Data Systems, Inc. (IDS) has unveiled a 132-column printer that can reportedly produce correspondence-quality overlapping dot matrix char. at

high print speed. The Model 560 is intended for data and text processing applications, prints bidirectionally at speeds up to 150 char./sec and is lighter than its competitors, the vendor claimed.

IDS's Dotplot graphics option enables the Model 560 to print a range of high-resolution graphics such as block letters and complex illustrations and charts under software control.

The Model 560 has a standard RS-232C serial interface as well as a Centronics-compatible parallel interface. Serial transmission rates from 110- to 9,600 bit/sec are switch-selectable.

The product costs \$1,695 and the Dotplot option costs \$99, IDS said from 14 Tech Circle, Natick, Mass. 01760.

Zenith Offers **Updated Z19**

GLENVIEW, Ill. - Zenith Data Systems Corp. has introduced an enhanced version of the firm's CRT terminal for the small computer market.

The Z19 "smart" data termi-nal features a deflection system that creates a smaller spot size for sharp resolution, a company spokesman said. The terminal's 12-in. diagonal screen has a 24-line by 80-char. format and a 25th user-status line.

The keyboard has enlarged high-use keys, a separate numeric keypad and direct cursor control. Interfacing of the Z19 is by standard EIA RS-232 at speeds of 110- to 9,600 bit/sec

Compatibility with Digital Equipment Corp.'s DEC-VT52 CRT terminal can be configured from the keyboard, an outside computer or a special interior switch.

With 90-day parts and labor warranty, the Z19 costs \$995 from the firm at 1000 Milwaukee Ave., Glenview, Ill. 60025.

Gandalf Modem. Data Set Out

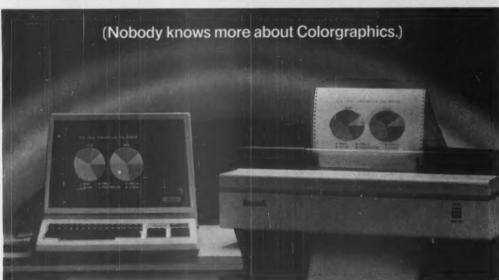
WHEELING, Ill. - Gandalf Data, Inc. has announced a dual-active modem emulator, the ME 922, and a synchronous data set, the LDS 250/3.

The ME 922 permits direct interconnection of two business machines at EIA levels. The module includes two independent channels which may be used in either synchronous or asynchronous applications, the vendor said. The ME 922 operates within the limits of EIA RS-232C and CCITT V.24 interfaces, the vendor said.

The LDS 250/3 offers an alternative to high-speed modems and channel facilities for short-distance communica tion, according to a Gandalf spokesman.

The ME 922 costs \$450 and the LDS 250/3 costs \$786 for RS-232C or V.24 interfaces, the vendor said from 1019 S. Noel, Wheeling, Ill. 60090.

sk Ramte



Now, Ramtek offers the first integrated system for MIS graphics users.

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bury, Mass. 01776.

Graphics Subsystem Features MPU-Based CRT Terminal FOUNTAIN VALLEY, Calif. - A com-

puter graphics subsystem featuring microprocessor-based CRT termin microprocessor-based terminal. graphics option board and printer is available from MQI Computer Products, Inc.

G100 microprocessor-controlled graphics option board is a Tektronix, Inc.compatible graphics option for Televideo TVI-912, 920 and 950 and converts off-theshelf video display terminals to Tektronix compatibility, the vendor claimed.

The system cost \$4,500, the vendor said from 18381 Bandilier Circle, Fountain Val-

lev. Calif. 92708.

Direct Updates VP800 Family With Text Editing, Block Mode SUNNYVALE, Calif. - Direct, Inc. has in-

troduced a local text editing and block mode capable version of its VP800 family of Video

The Video Processors - video terminals with some intelligence - now include the VP800/B, which adds an Ansi-compatible editing and block mode transmission capa-

bility to the features of the VP800/A processor video

The VP800/B costs \$2,350 from the firm at 1279 Lawrence Station Road, Sunnyvale, Calif. 94086

Indoor Pollution Controller Clears 2,000 Sq Ft Rooms

GIBBSTOWN, N.J. - An indoor pollution control system which reportedly operates without electrostatic devices is available from Airomax Corp.

The Model H700A system filters tobacco smoke, dust and odors from computer rooms up to 2,000 square feet in size. The filter costs \$695.

Airomax may be reached through P.O. Box 96, Gibbstown, N.J. 08027.

Power General Offers **Dual-Output Power Supplies**

CANTON, Mass. — Power General has introduced a new generation of dual output dc power supplies ranging in cost from \$49 to

The firm is also offering a free 32-page booklet detailing the electrical and mechanical parameters on ac-dc and dc-dc power supplies. Power General is located at 152 Will Drive, Canton, Mass. 02021.

Honeywell Graphics Copier Warms Up in Five Minutes

DENVER — Honeywell, Inc. has unveiled a video graphics hard copier that reportedly warms up in less than 5 min and produces 8.5-in. by 11-in. pictures in up to 16 grades of gray from raster scan video screens

The VGR 4000 consumes 100w on standby and is desktop or rack-mountable.

The price range is \$5,000 to \$7,000, the vendor said from Honeywell Test Instruments Division, P.O. Box 5227, Denver, Colo. 80217.

'Macrocode' Firmware

Amdahl Explains Why 580 Outperforms 470V/8, 3081

CW West Coast Bu SAN FRANCISCO - Amdahl Corp.'s recently announced 580 series systems have a faster instruction rate and are twice as fast as the firm's previous top-of-the-line com-puter, the 470V/8. What's more, the computers are said to be 20% to 25% more powerful than IBM's newest machine, the 3081.

Why? The answer lies in the computers' use of advanced logic circuitry, code" firmware and a modified instruction pipeline that enables the systems family to execute twice as many instructions in a given unit of time as the 470 V/8, according to the company's product marketing director, Wayne McIntyre.

In a recent press briefing held here by Am-dahl, McIntyre said that the 580 series' technological advances are the key to why the 5860 and 5880 outperform the 470V/8 and their IBM counterparts by such a wide mar-gin. The briefing was held just two weeks after the systems' debut to clarify the differ-

Retrieval System Based on Mini Replaces DBMS



The AFP System

CALABASAS, Calif. - A minicomputerbased text- and document-retrieval hardware system that is said to replace data base management system (DBMS) software has

been developed by Datafusion Corp.
The Associative File Processor (AFP) reportedly does the job previously done by elaborate software systems running on large mainframes," according to a company

spokesman.
Text retrieval is done by the system's Associative Crosspoint Processor (AXP-100) along with disk units, a Digital Equipment Corp. PDP-11 minicomputer, control software and a user front-end subsystem.

The AFP is said to utilize data streaming, scanning disks at rates up to 1.2M byte/sec, with 8,192 bytes of parallel query term memory. The effective character matching, at the maximum input rate, is over 9G byte/sec, according to the spokesman.

Typical applications would be research functions for newspapers, legal entities and medical facilities, the spokesman said. Documents may be stored as free text or par-

tially or fully formatted.

The system's basic configuration — the AXP-100 — consists of AFP and disk controller, firmware and user software with software license and documentation. It is at-tachable to an exisiting PDP-11 and can op-erate under RSX-11M, RSX-11D or IAS operating systems. Cost for the basic configuration is \$39,000 from the firm at 5115 Douglas Fir Road, Calabasas, Calif. 91302.

ences between the 580 and 470 families and to illustrate the firm's latest hardware and design advances that boost the computers'

Instruction Pipeline

In designing the 5860 and 5880, Amdahl shortened its instruction pipeline length from six to five stations and increased the number of instructions that can be overlapped, or executed at the same time. The 580 series permits overlapping execution of all five pipeline instructions, whereas the 470V/8 provides only about half as much overlap, McIntyre said.

The result is that, in ideal circumstances, the 580 uses only one machine cycle to exe cute each instruction, whereas the 470V/8 typically requires at least two such cycles.

This reduction in the cycles-to-instruction ratio accounts for much of the 580 series' huge performance increase over the existing 470V/8. The fewer the machine cycles a system needs to execute a typical instruction, the more instructions - and thus the more work - it can process in a given amount of

For example, the 5860 reportedly executes 12- to 14 million instructions per second (Mips) while the 5880 operates in the 22- to 24 Mips range. By comparison, the IBM 3081 clocks in at a conservative rating of 10 Mips, according to non-IBM sources.

One of the most important sources of the 580's increased computing power is its den-ser emitter-coupled logic circuitry, which holds 400 gate/chip, compared with 100 gate/chip for the 470V/8, McIntyre said.

The 580's logic circuits also boast a 33% shorter gate delay than their 470 series counterparts. In the 5860 and 5880, gate de-lays average 400 picosec; in the 470V/8, 600 picosec, McIntyre said.

MCC Design

The 580 series also owes part of its added processing power to improvements in the design of Amdahl's Multi-Chip Carriers (MCC), which are composed of both largescale integrated logic circuitry and random-

access memory (RAM) chips.
In the 580, each MCC holds 121 logic and RAM chips on a 14-layer printed circuit board. In the 470V/8, by contrast, an MCC contains 42 such circuits resting on a 10-layer board, McIntyre said. The extra

(Continued on Page 46)

HP 3000 Users Gain Tape System

WESTLAKE VILLAGE, Calif. - A highdensity, 6,250 bit/in. tape system for Hewlett-Packard Co. HP 3000 users has been introduced by Qualex Technology, Inc.'s Qualex Group.

The system features group-coded recording (GCR) and a 125-in./sec transport speed. The system is said to be Ansi/IBM-compatible and plug- and program-compatible with HP 3000 Series II and III.

It features a radial interface for up to eight drives per controller, auto thread/load for open reel and cartridge and switch-selectable dual- or triple-density (800-, 1,600- and 6.250 bit/in.).

The Qualex Group 3000 System ranges from \$34,000 to \$52,000, depending on performance and features selected. Delivery is 60-to-90 days from Suite 111, 31220 LaBaya Drive, Westlake Village, Calif. 91361.

NCR, NCR Japan Offering Japanese Language System

DAYTON, Ohio — NCR Corp. and its subsidiary, NCR Japan, Ltd., are offering a Japanese language information processing system that was developed jointly by the two organizations to add full Japanese language processing capabilities to an existing alphanumeric-Katakana-based system.

Japanese Advanced Processing Architecture by NCR (Japan) will eventually be used for Japanese language applications on all products the company markets. As a first step, NCR Japan has introduced a new I-8290 family of computer systems that support both conventional alphanumeric-Katakana processing and the new Ja-

pan software.

A minimum system, capable of handling approximately 3,600 different ideographs, can be expanded as required up to a maximum system accommodating approximately 9,000 different characters. I-8200 users can upgrade to Japanese language processing by adding Japan software, a Japanese-language CRT terminal and a Japanese-character printer to their present configurations.

Hardware for the system ranges between \$58,000 and \$120,000 and software is \$240 monthly. Prices are reduced for users upgrading or those with Katakana systems already. NCR is at Dayton, Ohio 45479.

Crip Rivals IBM 3890

DALLAS — Banctec, Inc. has announced a high-speed check reader/sorter similar to IBM's 3890 at about half the cost.

The Compatible Remote Item Processing (Crip) system is said to perform all the reader/sorter functions required in remote, regional or central processing centers. Crip operates at up to 1,400 document/min with a typical throughput rate of 60,000 document/hour.

Crip throughput may be significantly faster than IBM's 3890 on subsequent

document passes when both systems are operating remotely and when data image matching is used, Banctec claimed.

A typical Crip installation includes one or more reader/sorters, line printers, key entry terminals, data transmission devices, an operator console and — for reject repair and re-entry — Banctec's Core and Checkmender systems, the vendor said.

The Crip system costs approximately \$400,000, the vendor said from 14500 Midway Road, Dallas, Texas 75234.

Amdahl Explains 580 Series

(Continued from Page 45) four layers available in the 580's MCCs are said to contain additional internal data paths and thus reportedly contribute to the performance gap separating Amdahl's latest offering from the 470V/8.

The differences between the 580's and the 470's MCCs also extend to packaging. In the 470V/8, the MCCs are planar-mounted in a 79-cubic ft

Because the 580's control storage is less centralized than the 470's, the data paths between its functional units and their associated microcode are much shorter than in Amdahl's older systems. As a result, the 580 series' processing speeds receive yet another shot in the arm.

cabinet that holds up to 60 of the mod-

In the 5860 and 5880, by contrast, the MCCs are stacked horizontally in a 5.6-cubic ft console that provides room for 13 boards. Eight MCCs constitute a basic 5860 system, except for main storage, McIntyre said.

A 580's MCCs are interconnected by twin 12-layer circuit boards that form two of the MCC console's opposing sides. Such an interconnection scheme virtually eliminates discrete wiring between the MCCs and thus cuts the distance that signals have to travel between boards. Reduced signal-path lengths in turn translate into increased processing speeds, McIntyre explained.

Yet another reason for the 580's improved computing power is its extensive use of distributed microcode. In the 470 series, only the console functions and channel-to-channel adapter are implemented in microcode. In the 580 family, microcode is distributed as well to the processors' instruction units and execution units, McIntyre said.

Because the 580's control storage is less centralized than the 470's, the data paths between its functional units and their associated microcode are much shorter than in Amdahl's older systems. As a result, the 580 series' processing speeds receive yet another shot in the arm, the product marketing director added.

Correction

"Magnuson Competitor to IBM 4341-2 Bows" [CW, Nov. 24], the delivery schedule for the M80/42 and M/80 43 was incorrect. They will be available during the first quarter of 1981, not the third.



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Micos Adds Low End, Restructures Line

Computer Systems, Inc. (Micos) recently announced a low-end addition to its business systems product line as well as a restructuring of its entire systems fam-

At the same time, the company also unveiled a software package aimed at the wholesale distribution market.

The entry-level system, announced a few weeks ago at the Comdex '80 computer show in Las Vegas, consists of a microcomputer with 64K bytes of memory, two RS-232C I/O ports, a CRT terminal and a Centronics-compatible parallel or serial printer interface. The system also has 10M char. of hard disk storage, 5M char. fixed and 5M removable and the Micos operating system, a spokeswoman explained.

The system is geared as an entry-level machine for the firstbe fully software compatible with other Micos systems. As users' needs grow, the system can be upgraded to a Micos 100, 200 or 300 without the need for application software changes, the spokeswoman continued.

The recently announced computer will be available prior to mid-1981 and will sell for under \$20,000.

Mini-Line Restructured

Effective immediately, Micos has restructured its minicomputer product line, consolidating its six presently-available systems into three models.

Previously, the vendor offered the Micos 45, 75, 85, 100, 200 and 300 which ranged in configurations from a one-CRT terminal and 10M-byte disk system to a 32-CRT terminal and more than a billion-byte storage computer system. Now, the company is offering the Micos 100, 200 and 300. When the entry-level computer is made available next year, the Micos line will have a total of four models, the spokeswoman observed.

Micos will also change the architecture of its present mini-computer systems. Starting early next year, the firm will begin using Data General Corp. Nova 4 processors in the Micos 100 and 200 systems. The Micos 100 will use a Nova 4C with 64K bytes of memory and the Micos 200 will have either a Nova 4X with 128K bytes of memory or a 4X with 256K bytes of memory.

Previously, the Micos 100 and 200 used a Nova 3/4 and Nova 3/12, respectively. The Micos 300, however, will continue to use a dual Nova 3/12 processor configuration.

The processor changes were made to accommodate field service, the spokeswoman stated.

accompanied by a revised price list effective immediately. A sample Micos 100 system with 64K bytes of memory, an eightport multiplexer, real-time clock, master I/O port and printer controller, three CRT terminals, 10M bytes of disk storage, a 150 char./sec printer, the Micos operating system and cabinetry costs \$31,100. Previously, the cost for the same system was about \$40,000.

Also, a typical Micos 200 system with 128K bytes of memor nine CRT terminals and 160M bytes of disk storage and a 300 line/min printer sells for about \$99,100. Before, the same system with a different processor would sell for more than 115,000.

Finally, the East Coast-based company announced a software package for wholesale distributors, geared to run on any of the Micos computers. The Micos distributor system (MDS) is comprised of eight software modules that perform such routines as inventory, sales analysis and general ledger. Other features of the system include a multicompany multiwarehouse

(Continued on Page 51)

Desktop Systems Aid Small Firms

NEW YORK - Canon U.S.A introduced two small desktop business systems, the BX-3 and CX-1, designed to allow the small business to automate operations.

Both models are programmable in assembly language and Extended Basic. They use Canon's disk operating system.

BX-3 features include a built-in, 80-column impact printer that operates at up to 80 char./sec. The BX-3 uses a full typewriter keyboard and 10-key numeric pad.

The unit has a processing capacity of 64K bytes and is expandable to 128K bytes, the vendor said.

The CX-1 was designed for small businesses that want larger and faster operations than the BX-1 offers. It features a 12-in. P-31 green monochrome CRT terminal with a screen capacity of 1.920 char. It has the same internal capacity as the BX-3, but it

can be expanded by adding highspeed printers and an 8-in. floppy disk drive, the vendor

The cost of the BX-3 starts at \$5,600 and the CX-1 at \$4,000, the vendor said from 211 E. 43 St., New York, N.Y. 10017.

David Mini **Doubles as Terminal**

SUNNYVALE, Calif. - Logical Machine Corp. has released David, a user-programmed minicomputer that can be used as a stand-alone processor or as an intelligent terminal in a system of up to 20 users.

The unit features 1.25M bytes of floppy disk storage and a choice of printers. Other features include built-in logic and the ability to create programs in a user-defined language as opposed to traditional programming languages, the vendor said.

The unit is the latest in a series of processors which the firm calls Goliath and Tina. David operates in practically any spoken language including French, German, Italian, Portuguese and Spanish, the company noted.

A 1.25M-byte system with 64K bytes of main memory and a

Model 730 printer costs \$8,500, the vendor said from 1294 Hammerwood Ave., Sunnyvale, Calif.

Small Business Line Grows

ISELIN, N.J. - Prodigy Systems, Inc. has introduced the Prodigy Two, a two-user version of the Prodigy One computer, and Prodigy Junior, which it called a "high-performance economy system.

Prodigy Two includes two CRT terminals, three 8-in. floppy disk drives and a high-speed printer; all built into a desk unit. Prodigy Junior consists of one CRT terminal, a compact processing unit with two 5-in, disk drives and a line printer.

Both computers utilize the firm's software, which is comprised of the Prodigy operating system, the Protege data base inguage and a variety of applications

Prodigy Two costs \$16,700 and Prodigy Junior costs \$8,995. Inquiries can be made to the firm at Lincoln Highway, Iselin, N.I. 08830.

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WP Package Has Printer

MINNEAPOLIS — A word processing (WP) package that includes a letter-quality printer has been announced by Northern Telecom Systems Corp. for its Model 405, 435 and 445 distributed data processing systems.

The WP/ DDP Omniword package requires present users to add only the software package and a new keyboard for use, Northern Telecom said.

Working in plain English, the operator can request that simple function explanations be displayed on the datastation screen by pressing a help key. A central document catalog and

A central document catalog and built-in document-handling utilities stores documents, keeps track of document parameters, such as margins and page length, and also maintains historical and statistical information, including a document's author, subject, size and creation date.

The package offers a document merge function which combines documents or portions of them up to 160 columns wide and 10,000 lines or 1,000 pages long, the firm said.

Clustered Keys

Omniword offers clustered keys with four levels of functionality and an intelligent printer with a 2,000-char. buffer. The Striker printer can be equipped with an optional bidirectional tractor feed and single-sheet feeder.

The 445 system will support up to three workstations out of eight in the WP mode, due to memory limitations. The 435 will support two workstations in WP and the 405 will support one workstation, Northern Telecom said. About 20K bytes of memory is used per workstation.

The minimum system configuration on which Omniword can function is a Northern Telecom Model 405 with 64,000 char. of memory, one million char. of flexible diskette storage, one printer and one data station with a WP keyboard. The cost for this system, excluding the printer, is \$10,450.

Omniword software can be obtained for a \$750 one-time licensing fee or for a \$30 monthly licensing fee; the monthly software support charge is \$8. The Striker printer is available for \$4,290 or \$145 monthly (based upon a three-year lease and including maintenance). First customer deliveries are planned for April 1981 from Northern Telecom at Data Park, P.O. Box 1222, Minneapolis, Minn. 55440.

Micos Adds To System Line

(Continued from Page 49) capability, customer credit checks, tax computations and open inventory costing methods, the spokeswoman said.

The system is priced from between \$2,000 to \$4,000 per software module. Complete user support is available for MDS including installation, customization, training and reference manuals.

Additional information on the Micos entry-level computer, systems reconfigurations and the MDS software can be obtained from the company at 399 Fairview Park Drive, Elmsford, N.Y. 10523.

PE Announces Two Disk Drives

OCEANPORT, N.J. — Perkin-Elmer Corp. has announced two disk drives, the MSM80F and the MSM80F/HPT, that incorporate Winchester-type technolisev.

The MSM80F is a rack-mountable unit that costs \$13,000 (\$15,200 with controller); the MSM80F/HPT costs \$20,300 (\$22,500 with controller). Both drives have 67M bytes of formatted storage accessed by moving heads.

ted storage accessed by moving heads. Fixed-head storage is accessed by 96 data heads in the head disk assembly that provides 1.6M bytes of storage, the firm said.

The fixed media drives are both hardware- and software-compatible with existing Perkin-Elmer Corp. systems, including the Model 3220 and Model 3240, according to the vendor.

Model 3240, according to the vendor. Drives can be configured as mixed sets on the same controller, and performance of the recently announced Perkin-Elmer drives equals current MSM drives, the vendor said.

The disk drives are controlled by an internal microprocessor that provides such functions as seek, read/write, data separation, addressing and internal diagnostics. Internal diagnostics test and monitor all operations within the unit's circuitry.

Both drives are available for immediate delivery, Perkin-Elmer said from 2 Crescent Place, Oceanport, N.J. 07757.

Datapoint Offers Dual-Sided Disk

SAN ANTONIO, Texas — A doublesided, double-density diskette drive for use with Datapoint Corp.'s 1800 series of dispersed processors has been announced by the firm. The Model 1413 is said to store more

The Model 1413 is said to store more than 2M bytes of data, and up to four dual-drive units reportedly can be configured with an 1800 system, for a total of more than 8M bytes.

The diskette drive module is available for \$5,795. Quantity discounts and one-, two- and three-year leases are available from the firm at 9725 Datapoint Drive, San Antonio, Texas 78284.

Controller Bows For LSI-11 MPU

ANAHEIM HILLS, Calif. — Sigma Sales, Inc. has introduced a floppy controller for the LSI-11, 11/2 and 11/23 that supports one or two dual-density, single- or double-sided floppy disk drives.

The single dual-wide board replaces Digital Equipment Corp.'s RXV21 control logic and is completely software compatible with DEC operating systems and diagnostics designed for RX02 Sigma said

RX02, Sigma said.

The SCD-RXV21 is compatible with RX01/RX02 media, IBM 3740 format and Shugart interface. It is pin-to-pin-, signal-, and power-compatible with Q bus backplanes that support LSI-11 series MPUs and associated devices, the firm said.

The unit costs \$666.66 with a sixmonth warranty and a 24-hour replacement plan from Sigma at 6505 Serrano, Anaheim Hills, Calif.

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PDP-11s Get Status Monitor

SUNNYVALE, Calif. - A Digital Equipment Corp. Unibus-compatible status monitor for PDP-11 computers has been announced by Pacific Digital Systems, Inc.

Capable of being inserted directly into a Unibus slot, the PDM-U1 is said to exert a negligible load on the PDP-11 system while acting like a

56-channel logic probe. In PDM-U1's latched mode, the PDP-11 SSYN signal is used to initiate storage of the Unibus state in an onboard register. In its transparent mode, the operator can view the static nature of the PDP-11 bus, the vendor said.

The unit costs \$350 from the firm at 878 Hollenbeck Ave., Sunnyvale, Calif 94087

DG Dot Matrix Printer Fits Small Business Systems

WESTBORO, Mass. - A high-speed matrix printer for small business systems and distributed data processing has been unveiled by Data General

Three subsystems are offered: the Model 4355, with a programmed I/O controller; Model 4356, with a data channel controller; and the Model 4354, with a serial I/O interface.

The 4355 and 4356 run on Nova and Eclipse computer systems. The 4354 can be used with Micronova, Nova and Eclipse computers, a DG spokesman explained.

The 4355 costs \$6,650; the 4356, \$7,000; and the 4354, \$6,450, DG said from Rt. 9, Westboro, Mass. 01581.



DG's High-Speed Printer

paid

Interfaces, Controllers Out

ANAHEIM, Calif. - Datum, Inc. has unveiled a family of microprogrammed controllers and two tape interfaces.

The 6520 family of microprogrammed controllers was designed for large disk storage requirements of Di-gital Equipment Corp. PDP-11 com-

The 6520/A emulates the RP11/-RP02/RP03 subsystems, the 6520/B emulates the RH11/RH02/RP04/-RP05/RP06 subsystems and the 6520/C emulates the RK611/-RK06/RK07 subsystems.

The tape interfaces are to be used in conjunction with formatted tape drives. The models 3512 and 3520 are .5-in. magnetic tape interfaces for Data General Corp. and DEC computers. Designed to operate with any formatted industry-standard tape trans-port, they emulate standard tape subsystems from an operations software and diagnostics standpoint, the vendor claimed

The price for the 6520 family is \$5,900 and the models 3512 and 3520 cost \$1,700 each, the vendor said from 1363 S. State College Blvd., Anaheim,

DEC, DG Minis Get Controllers

SANTA CLARA, Calif. — Spectra Logic Corp. has announced two single-board, multifunction disk and tape controllers: the Spectra 20 for users of Data General Corp.'s Nova and Elipse minicomputers and the Spectra 21 for users of Digital Equipment Corp.'s

PDP-11 minicomputers.
The Spectra 20 offers emulation of DG 6067 disk and 6021 tape subsystems under RODS, AOS, Iris and Blis/Cobol. The Spectra 21 offers software transparency to standard DEC operating system and diagnostic software, the vendor claimed.

Both controllers are able to attach removable-pack or fixed-Winchester SMD disk drives and start/stop or streaming .5-in. formatted tape drives.

The Spectra 20 is available for \$5,100 and the Spectra 21 costs \$5,800. Spectra Logic Corp. is located at 2316 Walsh Ave., Santa Clara, Calif. 95051.

HP Training Prices Cut During December

PALO ALTO, Calif. - Hewlett-Packard Co.'s customer training courses on its computer systems will be available at a discounted rate through Dec. 29. During this period, three persons may enroll for the price of two.

HP training courses are taught in local sales offices in 16 major cities throughout the U.S. and Canada. They are offered on all HP systems, ranging from desktop computers to multiterminal computer systems.

Topics range from general introductions to operator training and applica-tions design, with an emphasis on hands-on use of HP equipment.

Fees vary from \$125 to \$200 per day, and programs last from two days to two weeks. Further details and course descriptions are available from any local HP sales offices.

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What's a Bubble?

Magnetic "bubbles" are actually cylindrical magnetized volumes, less than one-sixteenth the diameter of a human hair, in a thin film of crystalline magnetic material about a quarterinch square. The polarity, or magnetic direction, of the bubble is opposite that of the film, or "chip."

Bubbles are created when a uniform

Bubbles are created when a uniform magnetic field is applied perpendicularly to the chip — that is, as a series of "ones" and "zeros," which are the binary units of digital communication.

Bubbles can be moved about under magnetic force to transfer and store data. At the heart of a magnetic bubble memory system is the chip — a small, thin piece of crystalline material, usually a synthetic garnet.

Development of the Technology

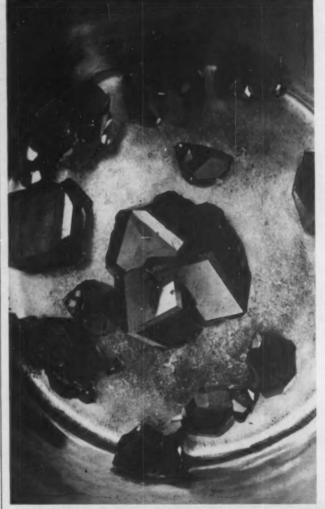
Currently, a bubble chip approximately one inch square developed by Bell Labs can store more than eight million bits of information. Future bubble chips will store several times more data as bubble and circuit element sizes are reduced.

Magnetic bubble technology is the result of research in both materials science and electronic systems design. Materials scienties had studied magnetic domains before the birth of bubble technology, but the discovery that bubbles could be ordered and manipulated to transfer and store data was made by Bell Labs researchers in 1966. The basic bubble patent is shared by Andrew H. Bobeck, Umberto F. Gianola, William F. Shockley and Richard C. Sherwood.

Prior to the discovery, Bobeck and others had examined ways to store data as magnetic units. Silicon integrated-circuit memories were in their infancy at the time, and ferrite core devices were the primary memory medium for computing applications. Although core memories were swift and reliable, they required extensive peripheral circuitry, consumed much electrical power and were bulky. The Bell Labs engineers and researchers therefore viewed bubbles as a potentially simpler, smaller, less costly memory alternative.

The advent and rapid implementation of stored program-controlled systems — such as electronic switching systems — in the telecommunications network emphasized the need for greater data storage capability. Bell Labs people investigated several memory technologies, including integrated circuits, charge-coupled devices and magnetic bubbles, so the memories best suited for particular applications (Continued on In Depth/2)

This article is drawn from a background paper on magnetic bubble technology produced by Bell Laboratories, Murray Hill, N.J.



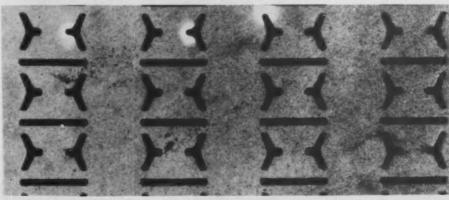
An advanced memory technology born at Bell Laboratories in 1966 promises a way to electronically store large quantities of information in telecommunications and data processing systems. The technology is based on magnetic bubbles — tiny magnetic spots created in thin garnet wafers and manipulated electronically to store and move data digitally.

Within the past few years, magnetic bubble devices designed at Bell Labs and manufactured by Western Electric Co., have gone to work in many Bell telephone companies, specifically in systems providing recorded voice announcements. More recently, bubble memories have been put into systems that measure the performance of digital microwave radio equipment.

Magnetic bubbles are expected to compete with some established memory technologies by offering advantages in speed, size, power consumption, reliability and cost. They can store more information per unit area than can be stored in silicon integrated-circuit memories, and they retrieve data much faster than some electromechanical magnetic ones (disks, drums and tapes). Further, they are nonvolatile (information is not lost if electrical power fails) and have no moving parts. These advantages should make bubble technology attractive for a variety of applications.

Photo at left shows rare earth iron garnet crystals in a large platinum crucible as they appear after being grown in the laboratory.

Below, magnetic bubbles (the light circles) are shown moving through a circuit pattern formed on a thin film of uniaxial garnet.



IN DEPTH

(Continued from In Depth/1) would be available when needed.

More work remained before magnetic bubbles could be transformed from an idea to a practical memory technology. Paramount was the development of a suitable crystalline host material. Because the economic viability of bubble memories would improve with their ability to store more data in a smaller area than competing memory devices, the bubbles had to be extremely small and easily and swiftly moved. The ideal material would deliver the desired bubble performance and also be economical to manufacture.

Although crystals of the orthoferrite class had been considered as bubble materials, subsequent investigations showed they had technical and economic limitations. Continuing research into materials and crystalgrowing processes by LeGrand Van Uitert and other Bell Labs materials scientists led to the utilization of synthetic garnet crystals.

At first, garnets were thought to lack a property essential for bubble materials — a uniform magnetization direction. However, Bell Labs researchers found that this property could be realized by introducing mixtures of elements such as yttrium, samarium, calcium and germanium during crystal growth and growing the crystals at relative low temperatures (800 to 1,200 degrees C), which permits the ordering of these elements at particular sites in the crystal.

Inexpensive Method

Another major need was to develop a potentially inexpensive way to manufacture the material. The most promising method was to deposit a thin magnetic garnet film atop a nonmagnetic substrate, or base, using a rapid-growth process and a supersaturated solution. Materials scientists at Bell Labs and Western Electric perfected this growth method, obtaining magnetic films of uniform thickness with few defects.

Methods for manipulating bubbles and packaging the chips were also required. The current method for moving bubbles is to immerse the entire chip in a rapidly rotating magnetic field (created by electromagnetic coils) to propel bubbles along precisely defined metal tracks on the chip's surface. The tracks — made of a magnetically conductive metal called Permalloy — were originally shaped as a series of adjacent "T-bars," but later, asymmetric "chevrons" and "semicircles" were selected because those configurations would yield higher-density circuits. As the rotating field was applied, the bubbles would travel along the track by jumping from one Permalloy element to the next.

Bell Labs and Western Electric engineers together developed a package for the magnetic bubble chips that closely resembles packages for silicon memories. In addition to housing the bubble chips, the package contains a permanent magnet to provide the perpendicular field over the entire chip and elec-

tromagnetic coils to provide the bubble driving force. (A recent Bell Labs development, promising greater speed and storage by replacing field coils with thin conducting layers to provide the bubble driving force, is described later.)

The package is enclosed in a Permalloy outer casing to shield against external magnetic fields, and is fitted with pins to connect with printed circuit boards.

The close ties between Bell Labs and

Western Electric enable new developments in bubble technology to be rapidly translated into designs for a manufacturable product. Some magnetic bubble manufacturing processes are newly developed. But, significantly, certain processes previously established for silicon integrated circuits are applicable to bubble circuit fabrication — an important synergism that helps reliability and reduces costs.

In the first step of bubble manufacture, a film of magnetic material (yttrium samarium calcium germanium iron garnet) is grown atop a thin wafer of gadolinium garnet — a nonmagnetic material. Each circular wafer — 3 in. in diameter — can yield up to 44 chips. The magnetic bubbles are formed in the film, which is only 120 millionths of an inch thick.

Bubble tracks are laid down using techniques common to silicon integrated circuit manufacture. A thin layer of Permalloy and a light-sensitive material are deposited atop the wafer,

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IN DEPTH

and a mask (or template) containing the track patterns is placed over the Permalloy.

After exposure to light, the metal not covered by the track pattern is etched away. (This lithography technique, as well as an electron-beam exposure technique used to create the high-resolution masks, are also Bell Labs developments.)

Production of the tracks requires only three masking steps, vs. more than twice that number to manufacture most silicon integrated-circuit memories. This helps hold down costs and reduces the chance of defective circuits.

Following inspection, the individual chips are cut from the wafer and readied for packaging. In the bubble memories now manufactured by Western Electric, four quarter-inch chips, each with a capacity of 68,000 bits, are mounted side-by-side in the package. First, the chips are surrounded by two wire coils that will produce the spin-

ning magnetic field to drive the bubbles. Then they are sandwiched between a pair of thin, rectangular permanent magnets that will provide a field perpendicular to the chip — creating and sustaining the bubbles.

The entire assembly is enclosed in a Permalloy casing and 32 pins provide the means for external connections. The 272,000-bit package is about 1 in. wide, 2 in. long and a .5 in. thick — about half the size of a cigarette pack. Like a track of data on a magnetic

tape, bubbles lined up in single file on a Permalloy track can be "read out" as they move past a fixed point in a magnetic bubble memory system. At equally spaced intervals, the presence of a bubble can represent a "one" and the absence a "zero."

Input and retrieval of data in bubble memory systems are accomplished by means of bubble "generators" and "readers." The generator is a small electrical loop placed adjacent to the Permalloy track. When a pulse of current is put into this loop, a bubble is formed and rapidly whisked away along the track by the rotating magnetic field.

The bubble reader retrieves data by detecting the presence or absence of bubbles as they stream along the track. In the bubble memory now manufactured by Western Electric, the track gradually widens like an inverted funnel to stretch bubbles into long magnetic bars. These elongated bubbles pass over a current-carrying Permalloy strip and briefly alter its electrical resistance. This lets through a short burst of current, indicating a "one" in the data stream.

To store long streams of bubbles, the Permalloy track can be made in various patterns. The simplest approach is to compactly fold a continuous track back and forth across the chip's surface. With this arrangement, the entire bubble stream is kept in constant motion, and desired units of data can be read each time the bubbles make a complete revolution. The current Western Electric bubble package incorporates this pattern.

In a more complex pattern, several loop-storage tracks are constructed adjacent to a "major" loop that handles data entry and retrieval functions. Data can be transferred between the major loop and storage loops as needed.

Useful Technology

Several technologies for storing and retrieving data are competing for data communications and processing appli-

The choice of a specific memory system involves trade-offs among data storage capacity, speed of data retrieval, reliability and cost. Silicon integrated circuits, for example, provide access to data in billionths of a second, but their cost per bit of storage is relatively high because of manufacturing complexities. (Semiconductor memo-

(Continued on In Depth/6)



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R.W. Bare, Assistant Corporate Controller, J I Case, A Tenneco Company, Racine, Wisconsin

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A small computer can make a big difference.

DEPTH

(Continued from In Depth/3) ries, however, are still lower in cost than older high-speed random-access memory technologies, such as ferrite core units.)

By contrast, electromechanical magnetic memories, such as disks and magnetic tapes, can store vast quantities of information at an extremely low cost per bit, but access to specific groups of data is relatively slow because of the mechanics of addressing

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Originally conceived as an alternative to ferrite core memories, magnetic bubbles are emerging as a technology that will bridge the gap between relatively fast but expensive silicon integrated-circuit memories and relatively slow but low-cost mass memo-

And, though access to data in bubble memories — which is measured in thousandths of a second — is slower than in integrated circuits - measured in billionths of a second - data retrieval times with bubbles are comparable to those of the speediest magnetic disk or drum memories

Appropriate Applications

Certain characteristics could make bubble memories the most attractive choice for certain applications. For example, the bubble memories' ability to retain stored data despite electrical power failure would be a major advantage. And the lack of moving parts would also be desirable in applications

SYSTEMS

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where size and maintenance are important factors.

The Bell System's first application of magnetic bubble memories was in a voice announcement system, delivering prerecorded, repetitive mes-sages such as, "We're sorry, you have reached a number that has been disconnected . . . " This system - the 13A underwent a field trial in 1977 at Michigan Bell in Detroit and is available to all Bell operating companies to-

The heart of the 13A Announcement System is the four-chip, 272,000-bit magnetic bubble package. Two of these packages are mounted on a single circuit board along with associated circuitry to convert digitally encoded recorded announcements into conventional analog signals for transmission over telephone lines. Each circuit board can store up to 24 seconds of di-gitized speech. Eight boards — each storing a standard message — can be loaded into one 13A system.

The 13A system is replacing magnetic-drum units that store one message each. Since each of those units is the same size as a 13A system holding eight message boards, the lat-ter saves considerable space. And, because it has no moving parts, the 13A eliminates the need for periodic maintenance and rerecording of announcements deteriorated through voice track

In 1978, the 13A system was given a new use by New York Telephone — simulating some of the routine messages normally delivered by toll operators in handling coin telephone calls. Fiftynine 13A systems throughout the company now provide a variety of mes-sages such as "please deposit 30 cents for the first three minutes.

Looking Ahead

There is growing interest in putting magnetic bubble memories to use as data storage devices in telecommunications equipment and other applications. At Bell Labs and elsewhere, ensubsystems capable of storing one million bits of information. These are described as memory "building blocks.

Prototypes of one memory subsystem, using the same bubble package as the 13A, are now in limited manufacture at Western Electric. Called the Serial Bubble Store (SBS), the unit can deliver information at a rate of 200,000 bit/sec and access stored information

in less than .4 sec.

Currently under investigation is the Parallel Bubble Store (PBS), which will incorporate several small loops for data storage linked to a major loop for data entry and retrieval. PBS will deliver data at a rate of 400,000 bit/sec and retrieve a specific unit of data in less than .01 sec. Cost will be higher because of its complexity and extra circuitry for memory management; PBS would be chosen over SBS where data access speed is the prime consideration.

(Continued on In Depth/8)



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NDEPTH

(Continued from In Depth/6)

Bubble memory subsystems are expected to have a variety of new applications in Bell System equipment. For instance, a newly designed measurement system that remotely evaluates the performance of digital microwave radio equipment incorporates bubble memories to store data. In addition, Digital Equipment Corp., Texas Instruments, Inc. and others have incorporated magnetic bubble memories into "smart" data terminals, which perform certain editing and storage

Commercially available 1M-bit bubble chips have been introduced by TI, Rockwell International, Intel Corp. and National Semiconductor Corp. In Japan, Hitachi, Ltd. also make a 1Mbit bubble unit that is available in the U.S. And Nippon Telephone and Telegraph has tested a 4M-bit bubble unit for use in electronic switching net-

Bell Labs and several other compa-

nies, including TI, Intel, Rockwell, IBM and some Japanese and European firms, are exploring ways to make magnetic bubble memories denser, more compact, faster and less costly.

Faster Pace

"Bubble technology is now at a point where major increases in data storage capacity and reductions in access time will be achieved more frequently," said Andrew Bobeck, co-inventor of bubble technology at Bell Labs. Today, 250,000-bit and million-bit bubble chips are already state of the art, and multimillion-bit chips are available in experimental form.

These improvements will be achieved by reducing the size of magnetic bubbles and distances between adjacent bubbles and by improving lithography resolution so that finer bubblemovement patterns can be created. These advances, along with new methods for moving bubbles, should also contribute to substantial reduction in access time and cost.

The companies involved in bubble research and development have taken different approaches

TI, for example, is the first company to develop for the commerical market a single-chip bubble package and to ex-ploit the concept of redundancy building in spare data storage space on the chip to substitute for areas affected by minor manufacturing defects. TI was the first company with a bubbleusing device on the general trade market - a "smart" computer terminal.

IBM's Work

IBM has made advances in bubble theory. The computer manufacturer has a major research effort under way to understand bubble physics and phenomena. One of its prime efforts in bubble memory design is to encode data in bubble "wall states" rather than in streams of individual bubbles.

One development that has been announced by Bell Laboratories involves an improved method for manipulating bubbles on a chip. Instead of moving them with a rotating magnetic field created by drive coils, the new method uses magnetic forces created by two wafer-thin conducting layers.

Because the coils are eliminated, the bubble package can be reduced to onethird its present size. The new propulsion method also promises a tenfold improvement in the rate of data movement. And, the compact, oval-shaped bubble track patterns etched in the driving wafers should permit a fourfold increase in storage capacity.

Toward Improved Economy

In addition, more steps in the bubble memory manufacturing process will then be compatible with integratedcircuit production techniques. This should further improve the economy of bubble devices

In the Bell System, bubbles could eventually be used in electronic switching systems to replace disk files that now hold the switchers' main operating programs.

Bubble memories may also find ap-plications in home and business telephone equipment, enabling new features to be developed.

Outside the Bell System, bubbles are expected to appear in various computring and data processing applications, such as in office equipment, electronic "cash registers," computer input and display terminals, microcomputer program and storage memories and, eventually, pocket calculators.

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Computerworld will "Forecast 81" Inside and Out in its combined Year-end Wrap-up Issue, December 29 and January 5, 1981. Ad close is December 12.

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IDMS The Dictionary-Driven DBMS That Meets the Key Factors for Success in Database Systems

IDMS

1. Vendor record



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☐ FIRST and most successful company formed to specialize in computer software products exclusively. 1968 ☐ FIRST EDP audit version of retrieval system and EDP auditors user group. 1970 ☐ FIRST CODASYL DBMS for IBM Computers. ☐ FIRST to build back-end database machine software. 1973 ☐ FIRSTactive dictionary-driven DBMS. 1975 ☐ FIRST computer software company to have 1975 public offering in 10 years. 1978 ☐ FIRST distributed data processing DBMS. ☐ FIRST IMS-DL/I ESCAPE Facility. 1979 FIRST Audit Information Management System. 1980 ☐ FIRST DBMS to meet the 6 key factors for success in 1980 1980 ☐ FIRST DBMS to be on Datapro Honor Roll

FIRST in profits, growth, and financial reserves of all independent database software companies.

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Cullinane Corporation has made the Integrated Data Dictionary the foundation of its completely integrated database management system, and this is the most important difference between IDMS and others. We've had it for four years while others still talk about it as a concept.

IDD, the <u>active</u> data dictionary, automatically updates dictionary contents, assuring accuracy and consistency of all data resources. The unique facility of IDD automatically reflects any program changes.

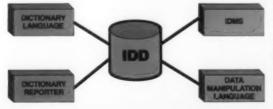
The Integrated Data Dictionary gives you a centralized resource of "data about data," providing control of all your corporate data resources, both automated and manual, database and conventional files.

The IDD also sets standards for data names across all systems, programs and files. This ensures that all users employ the same definitions to describe the same data, facilitating communication between data processing and enduser departments.

And the IDD maintains relationships between systems, users, programs and data elements. Because of this it can monitor the impact of proposed design changes on the system, in advance.

IDD is the integration point for the award-winning DBMS, IDMS, facilitating easy application development, enduser access to data and efficient processing in an on-line environment. The IDD is an absolute must in the growing complexity of today's typical computer operation.





Integrated Data Dictionary is the control point for IDMS, integrating all components. As a result, IDMS is a true dictionary-driven DBMS. In addition, the IDD is an active dictionary whereby the dictionary is populated automatically, greatly reducing manual input and ensuring integrity of the dictionary.







The IDMS DB/DC facilities include the Application Development System, batch and on-line, as well as INTERACT, OnLine Query, CULPRIT and Data Manipulation Languages for COBOL, Assembly, PL/I, and FORTRAN.

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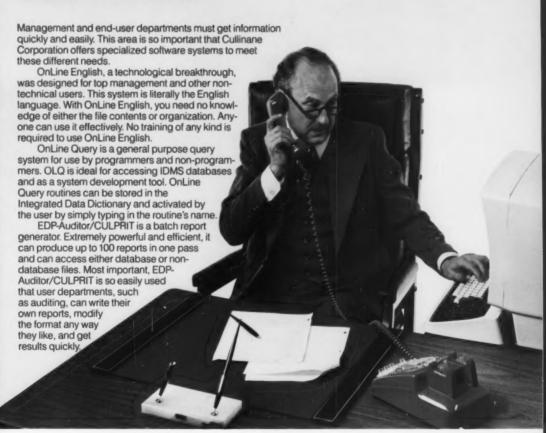
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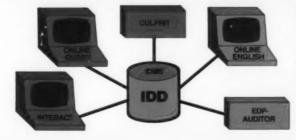
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This means you save all your investment in DL/I application programs.



Processing facilities, in addition to supporting distributed database networks, also include UCF, ESCAPE and the Shared Database System, which supports multiple CPU's sharing databases.

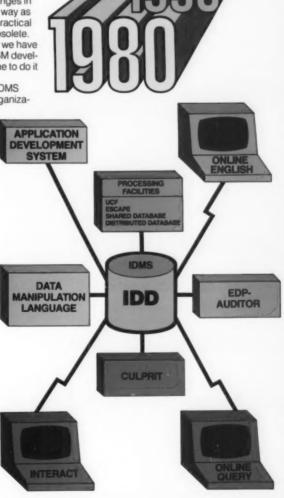


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You want the confidence of knowing that your IDMS applications can be audited – either by your own organization or your audit firm. Since we are a world

leader in EDP audit technology and offer users user-oriented software, including a library of audit routines especially tailored to the IDMS online environment, you can be sure of complete security. And...IDMS is the only DBMS to offer this degree of protection.



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With an unparalleled record for vendor support, systems enhancement and new product development, Cullinane Corporation is the most financially successful software company in the nation. Our performance in terms of growth and earnings has been consistently highest.

Over the past five years, we've invested 10% of our revenues in research and development to make IDMS the most flexible, powerful and complete DBMS on the market. Now we have the financial resources and manpower to meet our customers' requirements through the 1980's and beyond.

By meeting the six key factors for success in database software, IDMS has become the indispensable tool for applications developers, processing departments and end-users in business, industry and government to support on-line systems.

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Database: Cullinane

One of the exciting advantages of being in the data processing field is the chance to watch new disciplines emerge, develop and mature, all in a relatively short time span.

So it has been with data base. Topics, tools and techniques - such as data base design, data administration, data dictionaries, backup and recovery have all come into their own as viable concerns. As data becomes more of a recognized, manageable resource and as we try to do more and more with ever-expanding collections of data, we know that those topics, tools and techniques will be with us for a long time.

An ever-increasing number of data processing personnel and others are coming into close or occasional contact with the central physical embodiment of data base, the data base management system (DBMS). But it has be come quite clear that a large number of people don't understand hou DBMS are supposed to improve data processing - which is to say, they don't understand what the justification is for using them.

Furthermore, uses of the term "data base" remind me of the queen in Alice's Wonderland: it often seems to mean whatever someone wants it to mean. Also, since so many papers and books on the subject are too theoretical, too detailed or too obtuse, the fundamental points get lost.

A data base is simply a stored collection of data. A DBMS is a software tool that provides access to the data in an "integrated" (to be defined later)

What follows is a net description of the whys of data base, suitable for passing on to your boss, your subordinates and your colleagues (and even yourself - just don't tell anyone that you read it).

I've divided the discussion into five

- 1. Data base environment character-
- 2. Redundant data.
- Multiple relationships.
- General data management issues.

Data independence.

Data Base Environment Characteristics. In the earlier days of data processing, most of the emphasis was placed on the programs themselves. Hardware was expensive and limited in addressing scope. Programming was a new discipline and there was much to be learned about it in order to achieve the goal of efficient processing. Partial mechanization of the process and even standardization of style were unknown. In this environment, the treatment of the data itself was not the highest priority concern.

As data processing continues to grow, a number of the ground rules are changing. Hardware is becoming cheaper, software development has taken on a more standardized, "structured" form and large backlogs of new applications to be implemented have built up, making the huge amount of

Back to Data Bas(e)ics

BY MARK L. GILLENSON

time now spent on maintaining existing programs more and more unacceptable. It is becoming increasingly clear that the way in which we have handled (or mishandled) data in the past is one of the major factors in the program maintenance mess in which we now find ourselves. Today data:

- · Is stored in different formats.
- · Is often not shareable, necessitating redundant files.
- · Is often not easily recoverable or
- · Usually has its structure tied directly into the program logic.

As a result, data is all too often inaccurate, inconsistent or outdated. Changes in everything from access methods to tax tables require programming changes.

Enterprise Resource

At the same time, as an increasing amount of the enterprise's operational and strategic work becomes dependent on automated data processing, an increasing awareness that the data itself is an important enterprise resource is evolving.

Money, capital equipment, inventories and so forth are all important property to an enterprise. We have applied numerous management techniques to them (many of which, of course, have involved computers). Many people are now coming to the conclusion that data is also a manageable resource. A firm's data about its products, manufacturing processes, customers, suppliers, employees and competitors can, with proper storage and use, provide a significant competitive advantage.

At the intersection of all these happenings is the question, "How?" We want to manage data as an enterprise resource, while at the same time improving its treatment in terms of the technicalities of data processing. It becomes clear, even before we reach the discussion of the specifics to come later in this article, that some sort of a uniform system to manage data is needed. That class of uniform systems have come to be known as data base management systems

As the DBMS chosen by an enterprise comes into increasing use, it sets de facto standards for file structures. access mechanisms and programming techniques.

The sharing of data files among different applications in this environment forces a more careful and standardized look at the entire application development process. Now, whatever you do may affect others too in terms of data accuracy, update schedules and performance.

All of these points of standardization and increased control of the data processing environment can only serve to make for a less error-prone shop.

The data base environment leads to new levels of job specialization, which is really another form of standardization. Typically, a data administration function is formed to be responsible for the data base. Within that function are people who specialize in structural design, security, backup and recovery, performance and so on.

As the commitment to data base increases, the applications programming and operations groups develop a dependency on the data administration function to assume an increasing amount of the data-oriented legwork of the application development and execution processes. This will include data collection and verification, data base design (replacing the old file design step), integrity monitoring, security, backup and recovery - in effect a custodianship of thorough enterprise's data. That doesn't happen overnight, but rather takes place as a gradual transition. But again, that kind of standardization - people and functional standardization in this case can only lead to a more efficient, errorfree environment.

2. Redundant Data. Let's take a look at the problem of redundant data and its companion, the problem of integrity. First we will consider in the con text of one file, then in the context of

Redundancy Within One File

Suppose we are a sales organization and, of course, have to have a way of keeping track of our customers and our sales representatives. Figure 1 shows two simple, "flat" files (many occurrences of one record type), one for the sales reps and one for the cus-

(Continued on In Depth/22)

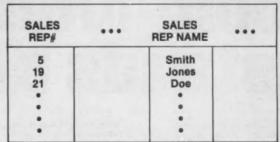


Figure 1A. Sales Rep File

CUSTOMER #	•••	SALES REP#	•••
112 215 223 324 527 632		5 19 5 5 21 21	

Figure 1. Separate Files

(Continued from In Depth/21)

The Sales Rep File is keyed on sales rep number (a unique number which can take us directly to the one record which deals with a particular sales rep) and has, as one of its other fields, the sales rep's name. The Customer File is keyed on (the also unique) customer number and has, as one of its other fields, the number of the sales rep who is assigned to that account. There is one record per sales rep, representing each piece of information pertaining to him just once, and there is a like situation for each customer.

That kind of data storage is said to be nonredundant. That is as it should be.

If someone comes along and wants to know the name of the sales rep who is identified by a particular sales rep number, he merely looks up that sales rep's record in the Sales Rep File (Fig-ure 1A), using the sales rep number as the key, and reads off the name. Similarly, if someone wants to know the number of the sales rep who is responsible for a particular account, he goes to the Customer File (Figure 1B) and looks up that customer's record, using the customer number as the key. So

far, so good.

Now, what if someone comes along and wants to know the name of the sales rep who services a particular account, identified by account number? Can that information be obtained from only one of the files in Figure 1? Clearly it cannot, since the customer number information exists only in the Customer File, and the sales rep name information exists only in the Sales

The only way to answer that question is to first look up that customer's record in the Customer File, find the number of the sales rep on that ac-count, then use that number to find that rep's record in the Sales Rep File and finally find his name in that record. That kind of custom-made, multicommand, multifile access is errorprone in terms of programming, expensive in terms of execution performance and, depending on the software involved, may have to be coded separately for each such access combina-

As One File

Ah, but if we knew that we were going to make such queries, why did we bother breaking the data up into two files in the first place? If it is all contained in one file, in a meaningful way, then there are no costly multicom-mand, multifile accesses.

Figure 2 shows the same data represented in one file. Notice that we show the sales rep (by number) assigned to a particular customer and the name that goes with a particular sales rep number, just as we did in the two files in Figure 1.

We can still answer the two original, simple questions we put to the files in Figure 1. But now, in addition, we can answer the tougher, previously multi-file question, "What is the name of the sales rep on a particular account?"
with just the one file in Figure 2 and one command.

Fine! Or is it? In the file in Figure 1A, there is one record per sales rep, each containing the particulars for a given rep once. Indicating which sales rep services a particular account is simply a matter of attaching the sales rep's number to the single record that de-scribes that customer in the file in Fig-

But in the combined file of Figure 2, where all of the fundamentally different kinds of information are intermingled, the particulars of a particular sales rep must be repeated for every account he services. A given sales rep may appear in several records in that file, and it makes no sense from a logical or a retrieval standpoint to specify, for example, the sales rep name for one customer the sales rep services and not for another. To be complete, the data must be repeated in every appropriate

Thus, whereas in the two files of Figure 1, the name "Smith" is attached to the sales rep number "5" just once, in the combined file of Figure 2, the name "Smith" appears with sales rep number "5" in as many records as customers that Smith services.

Numerous Problems

That situation causes a number of problems. For one thing it takes up a lot more storage space. (Try adding a home address field of 40 bytes and see how you feel about storing it once as opposed to, say, 50 times.) For another

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thing, it is rather unpleasant when it comes to updating. If Smith changes his (or her) name, the change must be recorded many times. The time consumed in doing that can be very costly, particularly if the records involved a e scattered all over a disk. Also, there is the nagging doubt that all of the occurrences may not have been updated, because of anything from programming bugs to execution time system failures. When that happens, it is called an integrity problem.

There appears to be a trade-off, but then trade-offs are hardly rare in the computer field. In the two files of Figure 1, we have no redundancy (at least among the nonkey fields, strictly speaking), but a query of the type we have been looking at requires a multi-command, multifile access. In the combined file of Figure 2, we have eliminated the need for a multicommand, multifile access for that type of query, but we have introduced redundancy among the nonkey fields. Neither of these situations is tolerable, for the reasons indicated above.

The question is, can we have our cake and eat it too? And that brings us to one of the key features of the data base environment. An integrated data management system - that is, a true data base system - is one in which data can be held nonredundantly (in the sense of the files in Figure 1) while at the same time, a query that requires a mixture of different kinds of data (such as the query we have been looking at) can be specified in a single command from the highest level programming interface. Any system that does not have this property really should not call it-self a "data base" system; "data management" system would be a more accurate term.

True Data Base

There are several approaches to designing a true data base system, which revolve around different storage structures and different times and ways of

SALES REP#	CUSTOMER #	SALES REP NAME	••••
5	112	Smith	
5	223	Smith	
5	324	Smith	*
19	215	Jones	
21	527	Doe	
21	632	Doe	

Figure 2. Combined File

"mixing" different pieces of data togother. (See Section 3 for an example of how this can be accomplished.)

Another benefit of the integrated approach is the encouragement it gives to finding new uses for the data in the data base by being able to derive new

information from combinations of different classes of data relatively easily.

There is another kind of redundancy which, while perhaps a bit more obvious than the one discussed above, is not necessarily easier to combat - but (Continued on In Depth/24)



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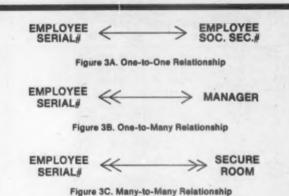


Figure 3. Relationships

(Continued from In Depth/23) for different reasons.

Frequently, certain data is needed by different departments in an enterprise in the course of their normal, everyday work. For example, customer name and address may be needed by the sales department, the accounts receivable department and the credit department. There will also generally be other pieces of information involving

customers which are only needed by one or two departments. Typically, the solution to this multiple need is redundancy. The sales department has its own stored file which, among other things, contains the customer name and address, likewise for the accounts receivable and credit departments.

While it is true that this keeps the departments from competing for the data, it opens up a can of worms, **EMPLOYEE** SOC. SEC. MANAGER SERIAL# 111-00-2222 Smith 111-22-3333 1572 Jones 2186 222-11-5432 Jones 522-52-5221 4522 Smith 333-55-9999 4991 Doe 123-45-6789 Smith 5283 654-32-1234 Smith 5542

Figure 4. Simple File

which is reminiscent of the problems we encountered in single file redundancy. First of all, storing a piece of data three times takes three times the amount of storage as storing it once. In addition, every time the data must be updated, it must be changed in each file where it resides. That wastes processing time, causes control nightmares and has the potential of leading to integrity problems if all of the data is not updated correctly and at the same time. Furthermore, the question arises as to whose responsibility it is to update the data in all of those different files, which are probably owned by widely separated departments.

Wouldn't it make more sense for such data to be stored just once, in a way that makes it accessible to all of the different groups that need it? That way there would be one group in charge of updating it, little wasted space, few integrity problems and so on.

The data base approach includes the concept of a common, shared data base, with controlled management and update responsibility.

3. Multiple Relationships. Let's turn

now to a discussion of the ways different pieces of data in a particular organization can relate to each other and the ways we might represent those relationships.

Suppose we are interested in storing data about our nonmanagement employees. We identify each employee by a unique employee serial number and want to keep track of the employee's Social Security number, manager and rooms to which the employee can be granted access. There is exactly one Social Security number and one manager associated with each employee, so we'll call them unary associations.

we'll call them unary associations. We further note that in addition to there being one Social Security number associated with a given employee, for a given Social Security number there is exactly one employee associated with it. In this case there is a unary association in each direction, and we'll call that a one-to-one relationship (Figure 3A).

Returning once again to employees and managers, we note that while a given employee has only one manager, a given manager may have many employees working for him. Thus there is

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a unary assocation in one direction and a multiple association in the other direction, and we can call the combination a one-to-many relationship (Fig-

Finally, consider the situation of employees and secure rooms. An employee may be authorized to be in several rooms, while a room will have several employees authorized to be in it. That's a many-to-many relationship (Figure 3C).

Easiest Storage

The question we must now ask is, "How easily can we store data involving the two kinds of associations and three kinds of relationships in simple files?

Roughly speaking, unary associa-tions and one-to-one relationships are handled well by simple files. After all, a key field and a simple nonkey field in a record represent one item being attached to another item (Figure 4). But when it comes to multiple associations and their resulting relationships, simple files leave something to be desired.

A multiple association can be repre sented "horizontally" with variable-length records (Figure 5A) — but that can cause space management and program logic headaches. It can be represented "vertically" with one partici-pant being repeated once for each of the other related participants (Figure 5B) - but that introduces redundancy. It can be represented with interspersed record types (Figure 5C) - but trying to find all occurrences of one of the record types is a problem. So none of these solutions is very good (although, when processed with certain other devices, such as indexes, relational constructs and so on, they may well qualify as legitimate data base solutions).

One of the capabilities of DBMS is that they provide the means of naturally and easily representing all of the above described data associations and relationships.

Although this is a discussion of the "why" of data base and not the "how," there would be a significant

void if it did not include an inkling of how a data structure can be used to implement the provisions discussed in these last two sections on redundancy and multiple relationships.

Hierarchical Model

Figure 6 shows an example of a struc-

ture based on the hierarchical data base model. Actually, there are two interconnected hierarchies: one headed by MANAGER and one headed by SE-CURE ROOM. There are three other approaches used in the industry: network, relational and one that is some times called pseudorelational or flat-file integrated.

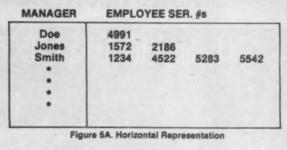
In Figure 6, each box represents a record type. Thus, for example, the box labeled "MANAGER" really consists of several fields (as any record would) such as manager name, manager address, manager age and so forth. Note the EMPLOYEE record. A manager normally has several employees, but an employee works for only one manager. A connecting line, called a branch, represents a one-to-many relationship.

The physical implementation of this is typically done with a variety of pointers. So for a given manager (which we assume can be reached randomly with an appropriate access method), I can store unarily associated data in the same record and multiply associated data in the next level of the hierarchy, all connected together by pointers (for example, a pointer from a given manager to a pointer-connected chain connecting together all of the employees who work for that man-

Notice that there is another (trivial) hierarchy dealing with secure rooms. We might be interested in knowing which employees are authorized to be in a given room, and in which rooms a particular employee is authorized to e. That is a many-to-many relationship and can be implemented with a set of connective pointers, represented by the box connecting the EMPLOYEE and SECURE ROOM records.

Notice, in terms of redundancy, that the employee information is stored only once per employee, regardless of how many rooms the employee is authorized to be in, while at the same time the room information is stored only once per room, regardless of how many employees are authorized to be in it. That's the way it should be!

4. General Data Management Issues. There are several concerns about the way we manage data which must be considered whether or not we are dealing with a data base environment. These concerns are inherent in storing, managing and accessing data. As we



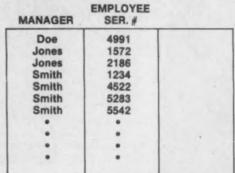


Figure 5B. Vertical Representation

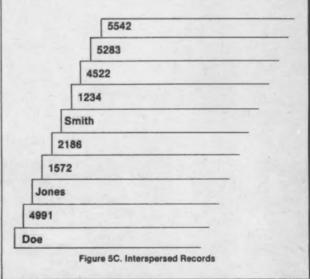


Figure 5. Multiple Relationship Representation

SECURE MANAGER ROOM **EMPLOYEE** TOOL

Figure 6. Two Interconnected Hierarchies

shall see, it is reasonable to assume that when we are dealing with a data base environment, the DBMS should provide the means for handling them. The four areas are:

- · Security.
- · Backup and recovery.
- Concurrency.
- · Auditability.

In all four cases, the key concept is that it makes sense to have a common way to deal with these areas built into the DBMS. That means that when a new application program is written, the programmer does not have to write

security, recovery and other routines from scratch, or try to use specialized, but unconnected, software packages for those functions. It means we can be confident the routines work, since they are standard, tested components of the DBMS. It means the functions are standard for all application programs in the environment, which leads to easier management of them and economies of scale in assigning and training personnel to be responsible for those aspects.

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(Continued from In Depth/25) a data processing environment, ranging from sign-on passwords for using a system to armed guards to stop someone from blowing up the computer. There are several aspects of security that are specifically data related and thus of interest in discussing DBMS. The two key points involved are preventing persons from seeing data they are not entitled to see and preventing them from changing data they have no business changing.

A problem that is a direct consequence of the shared, integrated data nature of the data base environment is preventing someone from accessing data to which he is not entitled access, but which happens to be attached or linked to data he is entitled to access. A manager who is giving up control of his data to the common data base will rightfully demand that that data be handled as carefully as when he had direct control over it. Furthermore, we may want to allow someone the right to simply look at some data, while at the same time forbidding him to up-

A facility that exists in many DBMS solves these problems. Essentially, a two-level system of describing data is established: one level to describe the physical, intertwined storage of the data and another level to describe the specific program/programmer views that are required by specific applica-tions. These are sometimes called physical views (or schemas) vs. logical

views (or subschemas), the latter being subsets of the former. At some time during the running of the program, a mapping must take place between the two. Not only is this organization an effective way of preventing unauthorized access, but also more sophisticated controls can be built in to solve the other problem, forbidding such operations as update, even when legitimate read-only access exists.

While methods vary from system to system, there are some general techniques that can be mentioned. One is the ubiquitous password (a "key" for a software "lock" controlling some aspect of the system). While we usually think of passwords as needed to get onto a system, they can also be required to gain access to specific data or to execute specific routines which can

gain access to particular data. Finally, a DBMS can monitor the programs that use it. This is another important step at a slightly higher

Backup and Recovery

Suppose a computer operator causes some unspeakable tragedy which mangles one of your disk packs. Or, suppose an error in input is discovered which took place 10 minutes ago and, in the data base environment, affected other data as well. These concerns are emphasized in the data base environment because of the shared and inte-grated nature of the data, the process of on-line update and the fact that oldstyle sequential processing had an in-herent backup (the transaction and old master files) that no longer exists.

The common solution mechanism for those problems, albeit fairly Neanderthal in nature, deals with data base dumps and logs. Periodically a dump is taken (a copy made) of the data base. During the operation of a data base environment, every change that is made to the data base is recorded on a log. By using the last dump and "rolling forward" through the log, starting with the first change that was made after that dump was taken, an obliterated data base can be recreated. By starting with the current state of the data base and "rolling backwards" through the log from the last entry, the data base can be unravelled to the point where an error occurred.

Besides the obvious needs for a backup and recovery mechanism, an additional benefit can be considered to be increased availability of data, since it will take a shorter length of time to

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repair the damage if it does occur.

When two users try to update the same record simultaneously (or as simultaneously as a multiprogrammed system allows), they have a rather nasty way of interfering with each other unlike when they are merely doing simple retrievals.

Say there are two users, A and B, who both want to update the same field in a specific record. Suppose the current value of that field is 100 and user A wants to add 20 to it, while user B wants to add 30 to it. To begin, user A retrieves the record and, with the magic of multiprogramming, gets in-terrupted and goes off somewhere else in the computer system to make the desired change to the field.

In the meantime, user B retrieves the same record (that is, another copy of it). User A then modifies the field and replaces the record in the data base. Finally user B makes his change and replaces the record in the data base. What's the final result? 130. The two operations were unaware of each other. Figure 7A shows this sequence.

You might question the probability of two users going after the same record simultaneously in a one-million-record file. Have you ever tried to get a reservation on a flight from New York to Miami for Chirstmas week the week before Christmas week?

Lockout," or some variation of the same concept, is the usual method used by DBMS to prevent this problem. Once one update operation has begun on a piece of data, any attempt to begin another update operation on that same piece of data will be locked out and, depending on the implemen-tation, may be rescheduled. Actually, the level of lockout varies

among different systems. Lockout at a high level — the file level, for instance prevents much more than that one particular piece of data from being modified while the update operation is going on, but is a low overhead solution. Lockout at a low level, such as the field level, doesn't hold up the rest of the data base, but is a comparatively high overhead solution.

Creates Problems

Unfortunately, as so often happens, the introduction of this beneficial device itself causes other problems which did not previously exist. Follow the next scenario.

User A retrieves record 1 from the data base (with the intention of doing an update) and locks it. At about the same time, user B retrieves record 2 and locks it. User A's program notes that in order to complete its update, it also needs record 2, but by the time it goes to get it, finds it locked by user B. Meanwhile, user B's program notes that in order to complete its update, it also needs record 1, but by the time it goes to get it, finds it locked by user A. And the two programs sit there forever, waiting for each other to give up what each other needs to complete its

processing.

That is called "deadlock" or "the deadly embrace." Figure 7B shows this sequence. It actually bears a close rela-

tionship to the "gridlock" traffic problem major cities worry about during rush hour.

There are several ways for DBMS to totally avoid, or at least detect, this condition. For avoidance, a high level of lockout can be used to lock a major area of data, within which all further accesses by the same program would be made (at a price in performance). Or, it can be demanded that all multiple requests be made in the same key sequence. For detection (which must be a consideration since total avoidprocedures are often unacceptfor performance reasons) timeouts, or the periodic checking of a matrix that keeps track of the lockable objects vs. the processes with authority to lock, are used.

Auditability

As more and more of an enterprise's data is stored in a data base, that data base becomes an increasingly important focus on the auditing function. Unfortunately, some of the same fea-tures that make the data base environment so attractive from a data processing point of view make it a more difficult environment from an auditing point of view. The increased structural complexities, the separation of the storage and programmers' views of the data - and especially the shared nature of the data - are all problems for the

Besides careful documentation, thorough program testing and the like, all of which should exist anyway, the primary tool of the auditor is the audit trail, and that brings us back to logs. While logs used just for backup and recovery often record only changes to the data base, logs or journals used for auditing purposes may also have to record simple retrievals from the data base and identify the users who made them. We should expect to hear a lot more about auditing in the data base environment as time goes on

5. Data Independence. Whether we are working in a simple file environ-ment, or in a data base environment with interconnected records, we are, by the nature of computers, faced with going beyond just thinking about rec-ords to the task of actually physically storing them. In fact, there are two points to consider that are closely related, although fundamentally different: the file organization and the access method. The former is the way the file is physically stored, while the latter is the way the data can be reached by programs, assuming a particular stor age structure.

In the nondata base environment, decisions involving the way the application program is written are usually made in concert with the choice of file organization and access method. In fact, the dependence is so strong that if for any reason the storage characteris-tics of the data should be changed in the future, the program itself must be modified as well. That is a very undesirable characteristic. In practice, storage structures do and/or should change to reflect improved storage techniques, new hardware, attempts at

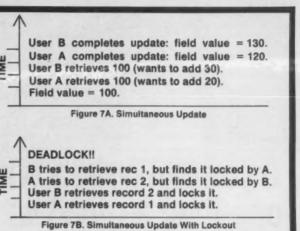


Figure 7. Concurrency Problems

sharing data and performance tuning, to name a few reasons. One of the reasons for the massive amounts of time spent on program maintenance is the typical level of dependence between programs and data.

We would like to be able to separate out storage and access considerations from programming to as great an extent as possible. Today's DBMS have been successful in this respect in certain aspects of the problem and unsuccessful or only partially successful in others.

An area in which today's DBMS are (Continued on In Depth/30)

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(Continued from In Depth/29) successful in terms of data independence is in changing the file organization and access method of the data used by an existing program. For example, changing from a direct storage method to an indexed method can be accomplished without substantial program changes in some commercial sys-

Another area of interest concerning data independence in DBMS involves adding new data categories to existing

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COMPUTERWORLD

structures, or the related action of changing the design of existing struc-tures. In spite of the complexities of the hierarchies and networks that programmers must contend with, such changes may not require any code modification, given that some reasonable programming standards have been observed and depending on the

type of change.
Of the kinds of DBMS currently on the market or being proposed, relational systems show the greatest promise in terms of data independence, many people feel.

In a true relational system, data inte gration is accomplished independently of physical interconnection of files. All rograms deal with a relatively simple file structure concept and are unconcerned with the later addition of new files. In terms of hierarchical and network-oriented systems, a proposal has been made to expand the concept of multiple levels of data from the current internal and external (or physical

and logical) levels to a three-level sys tem consisting of internal, conceptual and external levels.

Without getting bogged down in de-tail, the basic idea is to have a stable, mid-level platform of data representation (the conceptual level) with mappings between it and the other levels. It is argued that this arrangement would make data independence more feasible in those DBMS.

While this approach does have some interesting features, including the close relationship between the conceptual model and certain systems analysis techniques, its full implementation would not be an easy task and has not as yet been done.

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ber of the IBM Systems Research In-stitute (SRI) in New York. SRI is IBM's internal, graduate-level teach-

ing facility.

Gillenson holds a B.S. degree in mathematics from Rensselaer Polymathematics technic Institute plus M.S. and Ph.D. degrees in computer and information science from Ohio State University. He also holds the Certificate in Data Processing and is an associate editor of the journal Pattern Recognition.



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How to get what you pay for

Structuring the Software Development Contract

By Richard Raysman

As a result of the nature of the software industry, a disappointingly large percentage of software development efforts fail. The failures can be attributed to any number of reasons including lack of proper planning, unrealistic projects, lack of qualified personnel and large staff turnover.

Regardless of the reasons for failure, a failure can have expensive repercussions. Usually, the outside software vendor has either been paid substantial sums or is expecting to be paid a substantial sum. In addition, and equally as important, the user's data processing development effort can be set back

several years, which can have a seriously detrimental effect on the user's business operations, including making the user less competitive in certain business areas. Since licensed application software is presumably already in use and has at least a nominal proven track record, the failures are more likely to occur in development of cus-

tom software.

The key to a successful software development effort is to structure a contract that acts as a blueprint and sets a firm foundation for a positive result. A properly drafted and realistic agreement benefits both user and vendor. The agreement should be structured to catch problems at an early stage, giving both parties an opportunity to remedy them before they become too large to adequately handle. Of course, both parties want a contract that will protect them legally; but the main thrust of the contract should be the design of a practical approach to developing and installing a system.

During the last several years, the computer industry has evolved to the point where hardware costs have become a lower and lower percentage of the overall costs of a company's DP operations. Personnel costs for software development have, on the other hand, skyrocketed. As a result of the increased costs of software development and the severe scarcity of qualified programming personnel, the software industry has developed into what is now a multibillion-dollar industry.

Most users of data processing equipment, both large and small, will, at some point in time, look to an outside software vendor for some type of programming assistance. Generally, the software services fall into the category of either "application" software or

"custom" software. Application software is an already existing program or programming system that usually has a proven track record and that the vendor licenses to the user, with the vendor retaining ownership and the right to license to other users. Custom software is developed specifically for a user's particular and individual requirement, and ownership of this software usually passes to the user.

Middle Area

A middle area of custom software development includes custom modifications to already existing licensed application software. Many licensed packages are now written modularly, so the user or a consultant can more easily modify and tailor the package for the user's needs. A project to make substantial modifications to an already existing program should be approached as carefully as that of developing a system from scratch.

Prior to entry into serious negotiations with a vendor, every reasonable effort should be made by the user to consult in depth with its lawyer or with a consultant with particular expertise in the software application, for purposes of developing a negotiating strategy. As in any contract negotiation, the side that is better prepared and has a better concept of what is needed more frequently gains better results in the bargaining process. The user should define as well as possible the important items to require from the vendor.

In general, a user who has taken the time to be well prepared not only obtains a more favorable contract, but also has a greater chance for a successful system installation. In his preparations, he has probably identified the strengths and weaknesses of his installation and has a greater understanding of possible problems.

Watch Out for Turnkeys

A contract for a "turnkey" system should be approached with particular care. With a turnkey system, the software vendor performs all the development for the user and installs the system in an operational mode. Turnkey systems have a high incidence of failure, as is evidenced by the many lawsuits resulting from failed installations.

The reason for the many failures is

related to the nature of the DP industry. Once a software system is installed, it must be maintained on a regular basis.

It is also helpful, in the daily operations of the system, if the user has a full understanding of the intricacies of the system. Accordingly, in any software development project, user personnel should take an active role.

The user's involvement should be ensured as a clause in the agreement. A user's active involvement is beneficial in several ways. Once the vendor completes the project and proceeds to other customers, the user can maintain the system himself. An equally important benefit is that user personnel will be able to monitor the vendor's progress and alert user management if time schedules begin to deteriorate or if the project appears to be drifting off course as a result of any variety of causes. For this reason, vendors may discourage user involvement, so it is important to include a user participation clause to ensure the user's ability to monitor the project.

Progress Reports

Another important clause that does not go to actual performance, but is a significant protection to the user, relates to periodic progress reports. Timetables for software development projects tend to deteriorate quickly. Consequently, the agreement should include a clause requiring the vendor to provide a progress report to the user twice a month. There should be a further requirement that a senior management executive of the vendor provide a summary of the project's progress to a senior executive of the user on a monthly basis.

Although this reporting system will not ensure the success of the project, it will allow the user to be alerted at an early stage to potential problems. It will also encourage the vendor to give immediate attention to problems as they occur instead of waiting until the situation deteriorates. It is not uncomon in a software development project for a user not to find out about a serious problem until six months, a year or

more has passed.

Along the lines of an early warning system, a tentative timetable should be included as an exhibit to the agreement. Although the timetable can be (Continued on In Depth/32)

(Continued from In Depth/31) nonbinding, any slippage can be a warning that the project is in trouble. It has the effect of giving the user client an earlier view of potential problems.

Although this article is oriented toward the needs of user clients, it should be noted that a properly structured software agreement is more beneficial to a vendor than a sloppy agreement is. A good agreement helps to assure the ultimate and timely successful completion of the project, which is, of course, to the vendor's benefit. A good agreement also clearly defines the obligations of the user. Thus, after a project is initiated, if the user makes unreasonable demands or refuses to perform its part of the bargain, the vendor can look to the contract for protection.

Defining Deliverables

One of the most important functions of a good agreement is defining the actual deliverables under the contract. What has the vendor promised that the system can do? This is where the user, especially an inexperienced user who is unfamiliar with contract procedures, must be particularly careful. The natural inclination may be to view the deliverables as they would be viewed in a contract for a tangible product such as an automobile or machinery.

The real danger is that the vendor will deliver a series of programs that the vendor claims meet the letter of the contract, but which are clearly inadequate for the user's business needs. The user should insist on three clearly defined commitments from the vendor to properly protect himself.

The first requirement should be a clear, detailed design specification describing the specific deliverable items. The detailed design can include file layouts, flowcharts, program documentation, output descriptions, user manuals, operation manuals and screen layouts, if a teleprocessing system is involved.



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The detailed design can be performed as a separate proposal prior to entry into the performance agreement, or it can be a part of the performance agreement, with the understanding that it will become an exhibit to the performance agreement once the design is completed. If the design phase is included in the performance agreement, the user should have an option to terminate at the completion of the design phase if the user determines that the design is inadequate.

The user should recognize that the system may meet the design specifications, but still be inadequate for the organization's needs. Accordingly, as a second vendor commitment, a general description of the user's business functions intended to be performed by the system should be included. This description will form the basis of a warranty of fitness for a particular purpose.

It should be noted that when a software system is sold, the user is often unfamiliar with and unsophisticated in the intricacies of the particular industry application. The salesman for the vendor, in pressing for the sale, makes all sorts of oral representations, some of which may not be completely accurate. Often an unsophisticated user, in making its decision, relies upon these vendor representations. The user should be sure to reduce the vendor promises to a specific warranty of fitness for a particular purpose.

Third Commitment

third commitment the user should have from the vendor is that once the user begins to use the system for the processing of live daily transactions, the system will run without significant errors for a period of 90 days. It sometimes happens that a programming system will run for a period of weeks or even months without difficulty and appear to be error free. Then, because of a continuation of unusual circumstances, the system may have a serious failure. For this reason, the user should have a commitment of a reasonable period of time from the vendor (such as 90 days) during which the system will be continually operational.

Often, a vendor will present a detailed proposal to a user prior to entering into a formal contract. The proposal should be attached as an exhibit to the contract and be incorporated by reference into the contract. With this procedure, any representations contained in the proposal will be enforceable under the contract.

There is a procedure referred to in the DP industry, in both hardware and software agreements, as the acceptance test. The acceptance test is performed at the time the vendor states it is prepared to turn the system over to the user. An acceptance test is usually a series of transactions that are input into the system and are expected to produce certain results.

The acceptance test can be defined as a part of the detailed design specification. The user should be fully cogni-

zant of the significance and importance of a comprehensive acceptance test. The vendor's interest will be to design an acceptance test that is as simple and limited as possible, while the user's concern is that the acceptance test include all the combinations it can visualize occurring in the system.

Payment Schedule

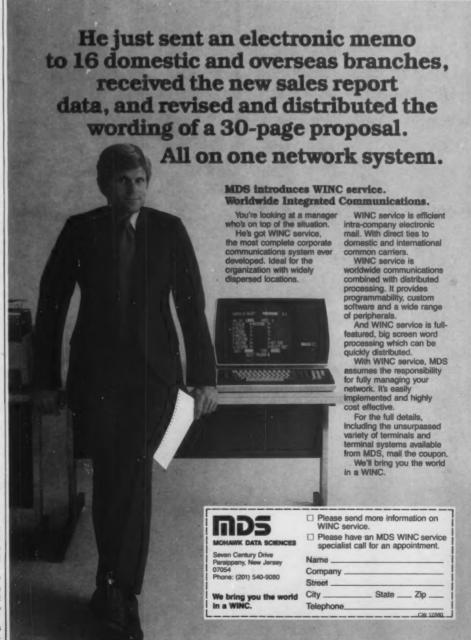
A key element in any contract, whether it be a software agreement or

otherwise, is a payment schedule. The user should be careful to tie periodic payments to particular completed and proven tasks that have been performed by the vendor. This is a technique to maintain the vendor's interest during the development of the programming system.

One of the most serious user errors is to make large front-end payments to the vendors. By making front-end payments, the user gives up his most powerful leverage. Regarding payments, a recommended user approach is to retain a portion of the overall payments until after the system has been fully operational for a period of time. In this way, the vendor will be completely committed to the implementation phase of the system.

Technical Support

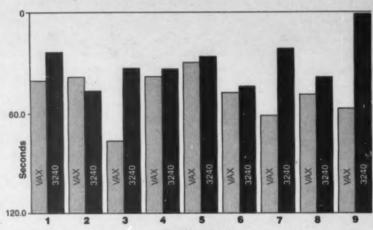
Another key element in any software development agreement is the vendor commitment to technical support. The (Continued on In Depth/36)



1. Performance Measurements

Benchmark	VAX 11/780	Perkin-Elmer	Performance
Name Name	CPU time	3240 CPU lime	Ratio*
DMCOAFA	1.140	0.907	1.26
PMS0154 PMS0254	4.710	4.485	1.05
		8.990	1.03
PMS0354	9.160		
PMS0454	43.610	43.451	1.00
PMS0554	86.420	86.123	1.00
PMS0664	1.610	1.350	1.19
PMS0764	7.040	6.679	1.05
PMS0864	13.730	13.370	1.03
PMS0964	66.830	66.066	1.01
PMS1064	132.920	129.727	1.02
PMS1124	1.520	1.306	1.16
PMS1234	2.470	2.424	1.02
PMS1324	1.310	1.618	0.81
PMS1407	251.560	37.327	6.74
PMS1507	50.260	57.657	0.87
PMS1674	22.440	23.005	0.98
PMS1724	52.550	53.133	0.99
PMS1807	50.180	34.766	1.44
PMS1907	32.020	34.679	0.92
PMS2007	17.720	20.264	0.87
PMS2107	13.450	20.242	0.66
PMS2202	33.311	26.352	1.26
PMS2324	121.610	137.997	0.88
PMS2402	0.940	0.539	1.74
PMS2502	0.720	0.562	1.28
PMS2624	122.920	227.689	0.54
PMS2708	4.850	0.961	5.05
PMS2809	103.770	0.006	17295.00
PMS2934	0.660	0.414	1.59
PMS3009	0.230	0.006	38.33
PMS3103	0.610	0.398	1.53
PMS3202	4.740	3.923	1.21
PMS3307	2.470	1.959	1.26
PMS3407	39.190	7.774	5.04
PMS3507	5.580	2.587	2.16
PMS3607	156.540	20.077	7.80
PMS3701	4.480	1.621	2.76
PMS3802	4.060	2.874	1.41
PMS3903	6.050	3.864	1.57
PMS4002	9.330	5.505	1.69
PMS4102	76.290	77.764	0.98
PMS4202	118.490	125.039	0.95
PMS4301	110.650	75.569	1.46
PMS4403	1.990	0.739	2.69
PMS4584	219.990	189.081	1.16
PMS4603	18.640	16.939	1.10
PMS4701	0.350	0.077	4.55
PMS4802	0.830	0.880	0.94
PMS4934	0.340	0.050	6.80
PMS5008	0.430	0.168	2.56
PMS5108	98.950	55.419	1.79
PMS5208	0.900	0.917	0:98
PMS5308	0.330	0.029	11.38
PMS5408	2.080	1.697	1.23
PMS5502	1.130	2.180	0.52
PMS5602	207.140	198.685	1.04
PMS5703	585.170	254.545	2.30
PMS5824	18.740	18.194	1.03
11100024	10.740	10.104	1.00

2. Perkin-Eimer 3240 vs. VAX* Average Time by Job Classification

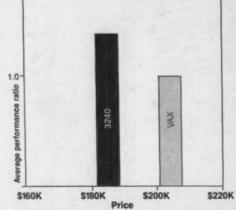


Job Classification

- 1. Integer
- 2. Single-precision
- 3. Double-precision
- 4. Math functions
- 5. Single-precision whetstone timings
- 6. Double-precision whetstone timings
- 7. Arrays
- 8. Job mix
- 9. Compiler technology

3. Proven Price/Performance





The configurations tested were 2 MB of memory, 67 MB disc, 75 ips tape, Floating Point Processor, CRT terminal, battery backup, and system software. The 3240 had a Writeable Control Store and Fortran Enhancement Package, while the VAX 11/780 had a Floating Point Accelerator.

*Performance Ratio = VAX 11/780 CPU time Perkin-Eimer 3240 CPU time

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All 58 FORTRAN benchmarks listed in Table 1 were submitted by

our customers and prospects reflecting their application needs. Applications that deal with the same kind of problems you face every day.

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In Table 2, we organized the benchmark results into nine common types of job classification, so you can see at a glance how the 3240 stacks up vs. VAX 11/780. (The ninth classification demonstrates the superiority of Perkin-Elmer's system software, in this case globally optimizing FORTRAN VII.)

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(Continued from In Depth/33) vendor is generally the expert in the field, whereas the user is a novice. There should be a commitment from

the vendor to have adequate technical personnel available before, during and after implementation to assist and guide user personnel.

As part of the support, the vendor should also be committed to providing adequate training for user personnel. Software systems are often complex and require detailed training. The

training can take the form of both informal in-house training at the user site or more formal structured education at the vendor location. The training should include courses not only for the user's technical personnel, but also for the employees who will actually be operating the system. For example, when a system is being converted from manual to automated, operators who are improperly trained and inadequately prepared can kill the project at the very inception, even though the

system is perfectly adequate.

Within the software agreement, the vendor should make the representation that a particular hardware configuration is acceptable for running the software system. This representation is necessary so the user can order the applicable hardware for timely delivery, with lead times of six months or more sometimes required for delivery.

There is also the issue of the overall user budget. A need for more hardware may affect the user's decision as to which system to ultimately purchase. Since the vendor is the expert in the field, its opinion as to hardware requirements is expected to be relatively accurate.

Warranty Period

For at least one year after implementation, there should be a warranty period during which the vendor corrects program errors.

Depending upon the structure of the agreement, the user may want the or tion to terminate the agreement without cause. Such an option would en-able the user to cut losses if it appeared the project was getting out of hand and was doomed to failure. Of course, if the user terminated without cause, it would be anticipated that the vendor would be compensated for whatever efforts were expended.

Ownership of the software should be clearly defined in the contract. If ownership definition is omitted, a serious misunderstanding between user and vendor can come up later. The user should also request the right to work in process programs, especially when smaller vendors are involved. Particularly when longer projects are involved, access to the partially fin-ished system can be insurance to the user that the project can be completed even if the vendor is unable or unwilling to finish

As in any business endeavor, proper planning can spell the difference between success and failure. A detailed and structured software contract means that both user and vendor have given sufficient thought to their com-



the New York law firm of Brown & Raysman and chairman of the New York State Bar Association Computer

Raysman specializes in contract negotiation, litigation, protection of proprietary information and other areas of the law that relate to computers. He has written and lectured extensively on computer law for both attorneys and DP professionals.





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Study Sees Bad News in AT&T Changes

Unsuspecting AT&T customers may lose millions of dollars and some specialized carriers may go out of business because of major mar-keting changes AT&T plans to make, according to an Info-Dyne, Inc. study reportedly directed by two former Bell executives

In recent months, some Bell operating companies have applied to increase private-line service rates by 600%, an Info-Dyne spokesman noted. And AT&T plans to terminate Telpak, a discount service that reduces rates to users that buy several private lines. Further, Bell is revis-

ing its Wats rate structure.

The Info-Dyne study, led by former AT&T marketing director W. Porter tone and another, unidentified, former Bell manager, has found that private-line services now account for more than \$3 billion in annual revenues for AT&T. That is 10% of nonresidential revenues for Bell's Public Switched Network (PSN).

But private-line services also account for more than 30% of PSN expenses. Bell is going to correct this," Stone pre-

dicted.

The world's largest telecommunications

carrier is now installing technology that will allow service offerings similar to private lines but at far less cost, he said.

"Virtual private lines," for example, may be offered to customers through the PSN at rates well below those for conven-

tional private lines.

AT&T competitors, especially specialized carriers such as MCI Telecommunications Corp. and Southern Pacific Communications Co., "could suffer a signifi-cant loss of customers," the Info-Dyne study concluded. "Their suppliers and the communication satellite companies
(Continued on Page 54)

With Turnkey Minis, 370 Rival

TRW-Fujitsu to Dive Into U.S. Market

By Brad Schultz CW Staff

LOS **ANGELES** largest computer maker will dive into the U.S. DP market next year, introducing minicomputerbased turnkey systems in the first quarter and later challenging IBM's smaller 370 mainframes.

Fujitsu Ltd. mostly wants end users. It will offer them hardware they do not have to understand, but which is claimed to be more reliable than hardware U.S. vendors can afford to put in competitive systems.

TRW-Fujitsu Co. (TFC) here will sell, distribute and service a small business systems family based on Fujitsu's V series minicomputers, including the 16-bit V-830, which did well against U.S. competition in Australia

this year.

The company 51% owned by Fujitsu - whose assets exceed \$2 billion - and 49% owned by TRW, Inc. will pit the largest member of the family against Hewlett-System/38, Packard Co.'s current 3000 and expected Vision models and other comparable commercial systems. This largest system will be driven by the 32-bit V-850, up until now seen only in Japan.

The system will not rival superminis such as Digital Equipment Corp.'s Vax-11/780 and Perkin-Elmer Corp.'s 3200s, which address a technically more sophisticated user market, TFC vicepresident and general manager J. Garrett Fitzgibbons said in a re-

Retail Systems in Offing

LOS ANGELES - Besides small business systems and mainframes, TRW-Fujitsu Co. (TFC) plans to announce products for areas already served by its minority shareholder, TRW, Inc.

In the retail systems arena, the company mostly owned by Fujitsu Ltd. will show new products at the National Retail Merchants Association conference this January in New York. At some point in the first quarter of 1981, a retail point-of-sale system incorporating bubble memory, plasma display and an integrated magnetic stripe card reader will debut.

A typical configuration of this system will cost about \$5,315 per terminal, a TFC spokeswoman said. According to general manager J. Garrett Fitzgibbons, financial systems products such as automated teller machines will follow in mid-1981.

cent interview. Two other models in the V series, smaller than the V-850, are also likely to serve as the basis of turnkey systems in TFC's lineup, he said.

TFC will also sell, distribute and service Fujitsu M series mainframes that run up to two million instructions per second (Mips). These are not the most powerful M processors - the M182AD and M200 execute 2.5 Mips and 8 Mips, respectively and they will not threaten the plug-compatible systems offer-ings of Amdahl Corp., which is 28% owned by Fujitsu.

In contrast, Amdahl systems deliver at least 4 Mips, Fitzgib-bons said. IBM mainframes in the performance class TFC plans to enter include the 370/148, 370/158, 3031, 4341-2 and 3033S, according to performance ratings issued by IBM.

Fitzgibbons did not name the M models TFC plans to offer in the U.S., but Fujitsu's Australasian outlet - Facom Australia Ltd. has sold three models in the sub-2 Mips class: the M140F, M150F and M160F. IBM lost 24

(Continued on Page 60)

Trial of Alleged Micro Spy Opens

By Chris Simpson

Special to CW SANTA CLARA, Calif. - Peter Gopal, a California-based electronics consultant, went on trial last month in what may emerge as an important legal milestone for the rapidly expanding microcomputer industry. Gopal, 41, was indicted in November 1978 for allegedly attempting to sell sophisticated Intel Corp. computer chip design data and equipment to officials from Intel's arch-rival, National Semiconductor, Inc.

Although the trial itself is fo-

cusing on the alleged violation of California's trade secrets laws, there is another aspect to the case. Evidence seized in raids on Gopal's home and office appear to link him with an East German spy ring that has specialized in obtaining secrets from the microcomputer industry in the West.

According to Santa Clara County Assistant District Attorney Douglas Southard, who is prosecuting the case, Gopal obtained trade secrets and equipment for duplicating microcomputer chips from leading manufacturers such as Intel, National

Semiconductor and Zilog, Inc. by bribing disgruntled employees, then sold them to the highest

Gopal's attorney, John W. Clark, argued that the state must prove that it [evidence seized by the police] was a trade secret and that it was stolen" in order to get a conviction. "We don't think they can do either.

Many industry observers agree that what constitutes a "trade secret" in microelectronics is a gray area at best, with few precedents to guide a court's judgment.

(Continued on Page 54)



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Intel Commercial Systems Layoffs Tied to Division Reorganization

By Marcia Blumenthal

CW Staff PHOENIX - Recent layoffs of marketing and support personnel at Intel Corp.'s Commercial Systems Division in Austin, Texas, are related to the reorganization of the division rather than poor performance of any product line, ac-cording to Vaemond Crane, vice-president and general manager of the division.

Crane said the total number of employees terminated was less than 30. However, informed sources close to the company estimated the layoffs at 36, noting that some 20 management-level personnel had left the company voluntarily over the past several months.

The problem began in February 1979 when Intel acquired MRI Systems Corp., creator of the data base management product System 2000, Crane explained. At that time, MRI was developing a data base computer. After the acquisition, MRI, which became part of the Commercial Systems Division, beefed up its staff for the data base computer project.

However, in July of that year, Intel began examining that development project and

the following November, the company decided to ditch it, noting the desired product could be created using a different technology.

At that time, technical personnel involved with the data base computer project were transferred to other projects. However, some marketing and support people could not be absorbed into other parts of the Commercial Systems Division and layoffs finally became inevitable, Crane main-

Shortfall in Sales

However, sources said the layoffs also had something to do with a shortfall in predicted sales of the System 2000. Crane said sales of the product were higher this year than last and termed it "still a very competitive software product" even though it is 10 years

Further explaining the personnel cuts. Crane said that after the acquisition of MRI, two separate sales forces and marketing organizations existed - one for MRI and one for Intel's Commercial Systems Division. Although the Austin group handled sales and marketing of the System 2000 only, it was twice the size

of the organization here which carries the 3805 semiconductor disk product and add-on memory as well as the System

Since joining the company earlier this year, Crane has been attempting to reorganize the division, he said, merging the two organizations and apportioning personnel relative to their functions within the division. As a result of the changes, the Austin and Phoenix operations are now about equal in size, he reported.

Memorex Realigns In Streamlining Effort

SANTA CLARA, Calif. — Continuing efforts to stream-line its operations resulted in Memorex Corp.'s recent de-cision to realign its Business Systems Division (BSD), in-

cision to realign its business Systems Division (BSD), integrating it within its Storage Systems Group.

BSD was responsible for marketing Memorex's line of IBM-compatible peripherals for the System/3, 34 and 38. Sales for storage products will be handled through the Storage Systems Group. Sales people transferred from BSD will become part of a dedicated small business equipment sales force, Memorex said.

Terminal and printer products formerly marketed by BSD will be marketed by the Communications Group. No BSD product lines were dropped, Memorex said.

Memorex said the former BSD manufacturing plant will

continue production and no layoffs are expected at that

Alleged Micro Spy Put on Trial

(Continued from Page 53) Industry lobby groups such as the American Electronics Association are presently pressing Congress for legisla tion which will give copyright coverage to microcomputer designs. This move, they say, will slow the diversion of expensive research to "reverseengineering" firms, such as Gopal's, which copy designs and then market similar or identical designs for building microcomputer chips under new names.

According to Intel Chairman Dr. Andrew S. Grove, such reverse engineering has al-

ready given substantial advantages to Japanese firms and the Soviet Union, which have made concerted efforts to obtain U.S. microcomputer technology.

A conviction in the Gopal case, most observers agree, would tend to restrict the activities of microelectronics consulting and reverse-engineering companies, at least in California, where the industry is most concentrated.

Additional Charges

A recent secret U.S. Department of Commerce study leaked to the press last February, however, made far graver charges against Gopal. The study cited the connection between Gopal and an Austrian physicist and businessman named Rudolf Sacher as the probable source of stolen microcomputer designs that have found their way to East Germany and the Soviet Union.

According to documents on file with the California Secretary of State, Gopal's company, Semiconductor Systems International, was cofounded and partially financed by Sacher, whose Vienna-based company also specializes in reverse-engineering computer chips and other microelec-tronics. It is Sacher's close relations with the East German government that the Commerce Department finds so disturbing.

Spy Ring?

Werner Stiller, a former lieutenant in the East German state security service who defected to the West in 1979, alleged that Sacher is at the center of a successful East German ring that has specialized in obtaining information on the Western microelectronics industry.

Stiller's defection touched off a chain of arrests in West Germany which has resulted in the convictions of 12 West German government officials and North Atlantic Treaty Organization personnel. Austria, however, is a neutral country. and its attitude towards agents

of the Soviet Bloc is more tolerant than that of West Germany. Sacher and several of his business associates, who were also named as agents, remain free.

A recent report by the West German security agency, BND, charged that the East Germans are presently mounting an "intensified campaign" aimed at the industry. As many as 500 East German agents are involved, the report said, with an annual cost of \$28 million for this type of espionage alone.

denied Sacher has charges against him. Stiller made up the story, he is contending, to gain credibility with West German intelligence and the Central Intelligence Agency.

Although Sacher is presently refusing to talk to the press, he was quite frank about his relations with the East Germans in an interview published last spring in the Austrian business magazine Pro-"We have developed a method whereby we can place electronic circuits in one-tenth the space required pre-viously," he stated. "East Germany gave us the order and fi-nanced it."

Sacher denied obtaining secret information from Gopal, however, and Gopal denied buying or selling microcomputer secrets here in the U.S. Gopal, in an interview not authorized by his attorney, argued that he is being framed by National Semiconductor, Inc. to make him the "scapegoat" for the theft of computer tapes which National Semi itself, not Gopal, stole from Intel.

In a conversation which National Semi engineer Larry Worth secretly recorded, how-ever, Gopal allegedly offered to sell him the Intel tapes and commented that he had "just returned from Europe," where he had sold similar data. He also offered to buy "anything you can get" from National Semi, according to prosecutor Southard.

AT&T Changes Seen Bad News

(Continued from Page 53) could also witness a decline in sales.

According to Stone, "the specialized carrier business is based on a particular rate structure. When that structure changes, the reason for being

Eventually, these changes could leave some users of discount services with huge communications bills, Stone continued, or with expensive communications equipment that is obsolete. "It is essenequipment

tial," he maintained, "that business managers know where Bell is heading to avoid making the wrong business decisions."

Info-Dyne does not plan to make its study public, the company's spokesman said. Several companies under-wrote the project, which culminated in a three-part report.

Phase I of the report discusses recent technological improvements Bell has made to its PSN and how the changes will encourage users to migrate to the network from discount services.

Phase II estimates new tariff rates and presents a time-table for when the price adjust-ments will take effect, the Info-Dyne spokesman noted.

Finally, Phase III of the report is an overview of AT&T's presumed marketing strategy, including speculation on what equipment and technology will be in place and how it all works.

Phase III also discusses how these developments may affect the plans and financial dispositions of U.S. telecommunications users.

Although the study is not for sale, the Info-Dyne spokesman asked that inquiries regarding it be directed to Info-Dyne at 1700 W. 78th St., Minneapolis, Minn. 55423.

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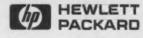
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Right now, Ligon's DPS 440s serve about 130 terminals at 29 separate locations. There are also two 1200 LPM printers, and two 6661 front-end network processors located at corporate headquarters.

But Ligon is growing and new Honeywell equipment is on the way. Ligon will soon install Level 6 computers for enhanced cost accounting, fleet main-

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Microdata Restructures To Increase DDP Product, **Small Business System Sales**

By Jeffry Beeler

CW West Coast Bureau IRVINE, Calif. — Microdata Corp. has quietly begun a corporate reorganization aimed at increasing the company's ability to sell and market its

two main product lines.

The restructuring has resulted in a split of its sales and marketing organization into two independent entities, one geared primarily to the company's domestic activities and the other to its international operations.

In product emphasis, the two sales and marketing organizations differ sharply from one another. The domessnarply from one another. The domes-tic division is concerned primarily with the company's small business systems line, while the international division focuses mainly on the firm's distributed processing products, ac-cording to Microdata Chairman Don

The two divisions also differ substantially from one another in their sales and marketing emphasis, Fuller

In most other respects, however, Microdata's domestic and international divisions will continue to share much in common. Both organizations, for example, will be served by the same manufacturing, engineering and service operations, Fuller said.

Fundamental Differences

Microdata's restructuring reflects the company's belief that small business systems and distributed processing constitute two fundamentally different product sectors and therefore need to e marketed and sold in fundamentally different ways.

Small business systems are sold primarily to first-time users and depend heavily on application software, whereas distributed processing products are aimed mainly at large, sophis-ticated users and are highly communications-intensive.

By dividing its domestic and international operations into two separate organizations, Microdata seeks to increase the company's ability to tailor its sales and marketing effort to the often conflicting needs of its two main product lines, Fuller explained.

Without a certain degree of special-ization in the firm's sales and marketing operation, "you tend to get a confusion between the two products and your customer base," the Microdata chairman said. "Your customer base isn't quite sure what it is you're trying to sell them."

As its name suggests, the domestic division will limit its sales and marketing activities - at least for the time being - primarily to the U.S. The international division, by contrast, will be free to sell and market its products anywhere in the world, including the domestic sector.

The decision to let the international division straddle the U.S. and foreign markets reflects Microdata's desire to expand its share of the domestic distributed processing market, Fuller said. In the past, the company's activities in the distributed processing field have been confined primarily to the international sector.

Serving as president of the domestic division will be Al Cosentino, formerly Microdata's senior vice-president of marketing, sales and service. Cosentino's counterpart in the inter-national division will be Gary Liebl.

Both Cosentino and Liebl will head all manufacturing, engineering, sales and marketing operations for their respective divisions.

Cosentino's previous position is now being held by Carl Jeremias, who came to Microdata about a month ago from Basic Four Corp., where he had served as vice-president of marketing.

Series/1 Cost Cut for OEMs

ATLANTA - IBM's General Systems Division is offering a 10% discount on its Series/1 small business computers for OEMs and other firms that remarket the system to end users.

The 10% cut is in addition to IBM's usual OEM discount, but the total discount is limited to a maximum of 20%.

The discount is being offered to OEMs, systems integrators and thirdparty programmers that enhance the Series/1 machine or programs in terms of function or capability and remarket them to unaffiliated third parties, an IBM spokesman said.

The 10% also applies to the approximately 200 software products offered for the Series/1, including the RPS and

EDX operating systems.

IBM will provide marketing support to the value-added remarketers, but will not help in remarketing efforts or provide marketing support to their end users. End users, however, may obtain maintenance service from IBM, the spokesman continued.

In addition, IBM's usual 90-day warranty on the Series/1 is reduced to 30 days for those machines purchased with the OEM discount.

Former Calcomp Head Founds Another Firm

SALT LAKE CITY, Utah - The former chairman, president and chief ex-ecutive officer of California Computer Products, Inc., George M. Canova, has formed a company to manufacture and market small business computers and intelligent terminals.

Novell Data Systems, Inc., based here, will offer its products worldwide through a network of computer dealers and distributors. Future plans call for an aggressive development program.

Major financing for the company is being provided by Safeguard Indus-tries, Inc., a Philadelphia-based corporation that provides technical products and services to commercial, industrial and government customers

Following Calcomp's acquisition by Sanders Associates, Inc., Canova be-came a director of Sanders while retaining his previous positions with Calcomp. He also founded Century Data Systems, which was acquired by Calcomp in 1972.

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Olivetti Forms Subsidiary

ELMSFORD, N.Y. — Olivetti Peripheral Equipment Sp A., manufacturer of printers and magnetic peripherals, has created a U.S. subsidiary to be known as Olivetti OPE. Slated to be incorporated in the U.S. by year's end, Olivetti OPE will operate as an independent company, according to a spokesman.

The subsidiary will assume responsibility for making and implementing decisions with regard to the U.S. OEM market. Although independent operationally, the group will have access to the resources of the Olivetti Group in research and development and financing.

Although currently there are no plans for manufacturing facilities in the U.S., there will be limited facilities to adapt and modify equipment at headquarters here.

HP 85 Marketing Pact Offered To Spur Applications Programs

By Jeffry Beeler
CW West Coast Bureau
PALO ALTO, Calif. —
Hewlett-Packard Co. is trying
to encourage independent
software suppliers to enter a
cooperative marketing agreement aimed at expanding the
range of available application
programs for the company's

Model 85 personal computer. The agreement, known as

the Software Supplier Program, is targeted primarily at software houses and system developers and was created to spur outside development of application packages for the HP 85, according to Glenn Theodore, computer product marketing manager for HP's Corvallis Division.

For independent software suppliers, the program pro-

vides an opportunity for increased sales by opening a new channel of product distribution and promotion.

bution and promotion.

For HP itself, the plan promises to boost Model 85 shipments by expanding the computer's potential customer base, Theodore said.

Wider Repertoire

Announcement of the Software Supplier Program comes at a time when HP is reportedly seeking to broaden the 85's repertoire of vertical applications.

Introduced early this year, the HP 85 was originally targeted primarily at scientific, engineering and technical users.

But since then, HP has enhanced the product with additional peripherals and software aimed at extending its capabilities to include a wide range of business applications, Theodore said.

HP realized, however, that it lacked the in-house programming expertise to supply application packages for every potential class of Model 85

The company concluded that much of the personal computer's business-related software would have to be developed and supplied on the outside.

Several Inducements

That line of reasoning led in turn to the formation of the Software Supplier Program, which reportedly gives independent software developers several inducements to write application packages for the HP 85's business-oriented

First, the plan will result in the creation and distribution of a directory listing all of the Model 85's available application programs and the names of their suppliers. The catalog, which will list both HP and non-HP products, will be made available to all of the company's dealers and sales offices by Dec. 1.

The directory, which is expected to be updated as often as every month, will also be distributed to all end users who subscribe to HP's User Library, Theodore said.

To further stimulate the creation of application programs for the HP 85, the marketing agreement will offer development systems to outside software suppliers at a 30% discount.

Under the plan, HP will also authorize its dealers to use cooperative advertising funds to help participating software suppliers to promote their products. In addition, suppliers will receive a complete listing of HP's dealers, Theodore said.





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EDS Unearths Gold Mine Of Labor in Small Town

DALLAS — Officials of a large supplier of computer services believe there is a labor gold mine in Smalltown, U.S.A.

Marion, Ill. — population 17,000 — is a six-hour drive from Chicago and a two-plus-hour trip from St. Louis. You can hardly get there by air.

However, one year ago Dallas-based Electronic Data Systems Corp. (EDS) opened a small claims processing facility in Marion to help reduce a large backlog of Medicare claims that had accumulated in EDS' main Illinois facility outside Chicago. Almost immediately, the decision to locate in this small Illinois coal-mining community began to pay off, the firm said.

The initial EDS-Marion operation employed 42 newly hired and newly trained data entry clerks, most of whom were the wives and daughters of unemployed coal miners. They began to break the back of a 450,000-claims inventory that had plagued EDS for more than four months.

As EDS' new Marion employees' proficiency grew, so did their numbers. EDS now employs 102 there and intends to expand the staff to about 160 by next April. The firm hopes to re-create the Marion experience in other small towns across the country because of its success.

Of the some 20,000 Medicare claims EDS processes every day in Illinois, 12,000 are processed in Marion. Additionally, EDS-Marion has begun processing correspondence from Medicare beneficiaries and providers that was once processed at EDS' facility near Chicago's O'Hare Airport.

Work Ethic

What makes a DP operation in such a remote area worthwhile is simply the work ethic and the low turnover rate, according to Kenn Hill, EDS vice-president, who oversees the company's Medicare and Medicaid operations na-

tionwide

"Our biggest mistake in Illinois was our initial site selection," Hill admitted. "We thought we could operate from one centralized facility and, because of the proximity of O'Hare, we chose the Chicago suburb of Des Plaines."

Des Plaines had a low unemployment rate, however, so EDS had a hard time hiring qualified people and was forced to recruit from outlying areas. Then, when jobs opened up closer to their homes, the new employees opted for them over a long commute.

EDS lost its new employees faster than it could train replacements, Hill recalled. The result: an unacceptable inventory for anyone, especially a new contractor that was trying to prove a noninsurance company can administer Medicare for the government as well as the traditional insurance carrier for less money.

EDS believes the results speak for themselves. It now has less than a 100,000-claims inventory in Illinois — about one week's work compared to 1.6 to two weeks' work on hand for most other Medicare carriers. "We firmly believe Marion saved the day," Hill said.

Rick Honeycutt, ED5' Marion account manager, said his people "zero out" their portion of the inventory every day. "To begin every day with nothing left from yesterday is every manager's dream," according to Honeycutt, who also hopes he never

Marion's 17% unemployment rate obviously provides the necessary work incentive, Honeycutt noted, but he is most impressed by the work ethic he has found abundant in Marion. "These people are honest, hardworking folks who take their jobs seriously," he said. His turnover rate since December 1979 has only been

Expansions

Digital Engineering, Inc. has relocated to facilities at 630 Bercut Drive, Sacramento, Calif. 95814.

General DataComm Industries, Inc. announced plans to expand its manufacturing operations with an additional plant in Waterbury, Conn.

The 389 employees of Qantel Corp. have completed their move into the company's \$6 million headquarters at 4142 Point Eden Way, Hayward, Calif. 94545.

Univac has broken ground for a semiconductor facility in Eagan, Minn., south of Minneapolis.

Emulex Corp. has nearly doubled its headquarter space with the addition of another 10,000 sq for of production space. It is located at 2001 E. Deere Ave., Santa Ána, Calif. 92705.

Integrated Circuit Engineering Corp. has announced the move of its headquarters to a site at 15022 N. 75th St., Scottsdale, Ariz. 85260.

Verbatim Corp. has made plans to open a facility in South Yarra, Australia, to manufacture flexible disks.

SCM Corp. is building a multimillion dollar computer center in Durham County, N.C., scheduled for completion late next year.

First Computer Corp. has begun construction of a \$1.5 million headquarters facility in Westmont, Ill. The 38,000 sq ft site will house First Computer's offices, warehousing, system integration and testing.

Buro-Und Datentechnik, of Rottweil, West Germany, manufacturer and distributor of paper-handling devices for computer printers, has opened a manufacturing plant in Fountain Valley, Calif.

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TRW-Fujitsu to Dive Into U.S. Market

(Continued from Page 53)

Australian accounts, representing 31 CPUs, to Facom in competition against those models and other M processors, a Facom spokesman told CW recently. The M140F executes .35 Mips and features five data channels and a main memory capacity of 1M to 2M bytes, he said. The M150F runs .5 Mips and features six data channels and a main memory capacity of 2M to 4M bytes. The M160F runs .8 Mips and has eight data channels and a 2M- to 6M-byte capacity.

The M series systems to come from TFC will not compete as IBM plug-compatible machines in the usual sense, Fitzgibbons emphasized, although Facom has sold them that way. TFC will provide its own software and market complete systems, he indicated.

Australasian Experience

Facom is significant to American users because more than 110 M series customers in Australia, New Zealand and Papua, New Guinea, can soon talk to them in English about their experiences with the Japanese systems as alternatives to major U.S. brands. Also, Facom plans to make its 30th V-830 in-

stallation this March

The Australasian region has the closest DP market to Japan that is sizable, English-speaking and served by a widerange of manufacturers that also cater to the U.S., Facom managing director Michael P. Rydon pointed out in a recent interview. Fujitsu saw Australasia as the place to start competing against vendors from English-speaking countries in English-speaking countries, using local people as managers, he said.

Facom's success may have led Fujitsu to its joint venture with TRW as well as the launching of other U.S. ventures this year, Rydon continued. Marketing executives with several firms that sell major brands of U.S. DP products to Australia agreed that Fujitsu systems will sell successfully in America.

Through domestic subsidiaries in different arenas of information technology, the giant Japanese corporation "will cut [domestic vendors] off at the knees," according to a marketing manager for one of Facom's principal competitors.

Hardware reliability is likely to be a major selling point of TFC systems in the U.S. For the V series minis, mean-

time-before-failure estimates for major circuits are reckoned on the order of 50 months, Fujitsu representatives have claimed.

Common Problem

But TFC and Facom have a problem in common: finding applications software for their systems. Fujitsu can provide systems-level software, Rydon observed. "An understanding of English is not necessary for someone to write a compiler English-speaking users can apply," he pointed out.

Applications software such as general-ledger packages and query-response routines, however, must approximate English to be valuable in the U.S. For similar reasons, Fujitsu needs non-Japanese companies to write systems documentation in English, Rydon

TFC will write some of the applications packages for its small business systems and is evaluating proposals from other companies to write other packages. TFC is considering an offer from Martin-Marietta Corp. as well as from V series Pty. Ltd., a new Australian company formed to market Facom's V series minicomputers.

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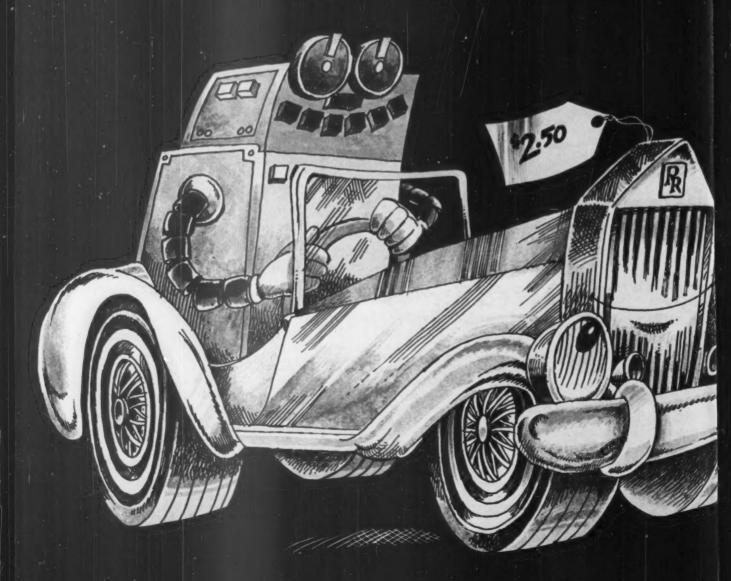
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(as the headline quote from a prominent industry executive makes so clear).

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M/A-COM to Pay Cash

Ohio Scientific, M/A-COM Sign

M/A-COM, Inc. has signed a definitive agreement with Ohio Scientific, Inc. of Aurora, Ohio, as well as the affiliate, Ohio Scientific of Puerto Rico, Inc., whereby they would become M/A-COM companies.

The agreement calls for the acquisition of all stock of both companies for an undisclosed cash amount. Ohio Scientific will hence operate as a separate M/A-COM company under its present management while it maintains its current market objectives and works to develop a broadened line of communications products in conjunction with M/A-COM's various companies.

Ohio Scientific designs, manufactures and sells a line of microprocessor-based computers for the small business market and the home

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In addition to the above-mentioned two plants, Ohio vices, Inc., a Denver-based

Mergers & Acquisitions

Bedford, Ohio, and Goleta,

Other Moves

Anacomp, Inc. has signed a letter of intent to acquire Zvtron Corp., a division of Dun & Bradstreet's National CSS subsidiary, for an undisclosed

Tymshare, Inc. has acquired

Scientific also has facilities in check guarantee service organization

> The interactive graphics sysmanufacturer, Vector General, Inc., announced that it is acquiring the assets of CPS, Inc., a Sunnyvale, Calif., manufacturer of precision high-voltage power supplies and color graphics display monitors. Terms of the acquisition were not disclosed.

MSC Forms Separate Firm For Sales, Service

SUNNYVALE, Calif. - Microcomputer Systems Corp. (MSC) has formed a company, United Peripherals, to sell and service its end-user disk storage systems.

The company will intially handle the large storage sys-tems made by MSC for users of Hewlett-Packard Co.'s 300 series computers. Sales and service operations are being set up here and in Los Angeles, Minneapolis, Boston and New York.

United Peripherals will sell the UP-1694 systems and its UP-1696 systems, which provide for 600M bytes of disk storage. More information can

be obtained from MSC at 432 Lakeside Drive, Sunnyvale, Calif. 94086.

New Companies

Other Companies

The formation of Jon S. Gould Associates, Inc., a management consulting firm, was recently announced. It specializes in matters related to distributed data processing, office automation and data communications systems, and is located at Suite F-12, Twin Lights Terr., Highlands, N.J. 07732

Garrick Lochhead, Inc. has been founded to provide scientific programming, process control software and advanced business systems. It is situated in Conway, Mass. 01341.

The Warner Group, an information processing consulting firm, was recently established to provide technical advisory service to industry and government. It is headquartered at Warner Center Business Park, Suite 400, 5850 Canoga Ave., Woodland Hills, Calif. 91367.

Ken Orr and Associates, Inc., previously the Advanced Systems Division of Langston, Kitch and Associates, Inc., has become a separate entity spe-cializing in the area of systems technology research aimed at improving productivity. It is located at 715 E. 8th St., Topeka, Kan. 66017.

A group of independent executives from various computer and electronic outfits has incorporated a new com-pany, called Data Systems Services, Inc., which special-izes in the sale, support and service of computers and peripherals to Digital Equipment Corp. users.

Agency Management Systems, Inc., which develops and markets advanced computer systems to independent insurance agents, has been launched by Commercial Union Insurance Companies. It is headquartered at One Beacon St., Boston, Mass.

Orders & Installations

Sanders Associates, Inc. has received an \$18 million U.S. government contract for a major production program to manufacture mobile signal exploitation systems.

Executive Corner

· George H. Conrades has been named president of IBM's Data Processing Divi-

· Franz Schulte has been appointed to the position of vicepresident of human resources

at the Basic Four Information Systems Division of Management Assistance, Inc.

· William E. Johnson has been named president of Heath Co., a wholly owned subsidiary of Zenith Radio

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· Lawrence Cabrinety has been appointed president of Computer Peripherals, a sub-

sidiary of Control Data Corp.

• Alex J. Najjar has joined CIS Equipment Leasing Corp. as vice-president and general counsel.

· Robert D. Briskman has been elected assistant vicepresident of systems implementation at Comsat General

· Albert S. Kaplan has been named vice-president of operations at Informatics, Inc., where he will be responsible for monitoring the perfor-mance of Informatics' four

operating groups.

• Ken Isaac has joined Century Data Systems, Inc. as vice-president of engineering, replacing Richard Charlton, not James Conway [CW, Nov.

Nickels & Dimes

Honeywell, Inc. declared a regular quarterly dividend of 75 cents per share payable Dec. 15 to shareholders of record Nov. 28.

555

Timeplex, Inc. announced a three-for-two stock split of its common stock in the form of a 50% stock distribution. The distribution will be issued Dec. 29 to holders of record Nov. 21.

Intelligent Systems Corp. has filed a registration statement with the Securities and Exchange Commission for a proposed public offering of 600,000 shares of its common stock

Dataram Corp. has pur-chased convertible notes and related warrants of CSP. Inc. from various institutional



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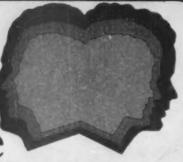
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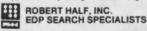
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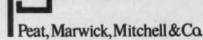
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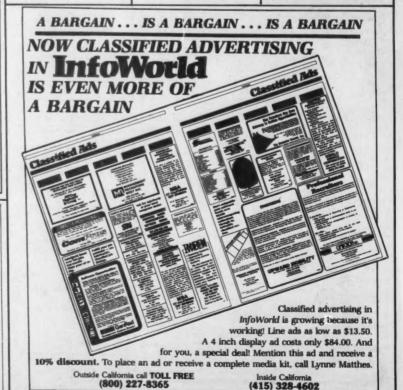
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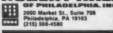
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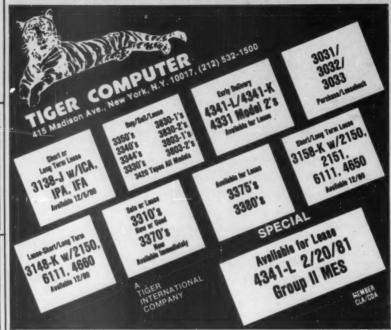
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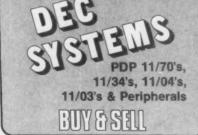
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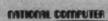
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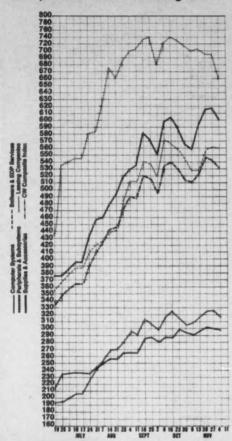


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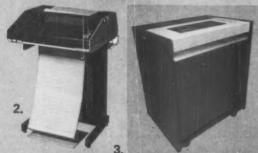
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E				CE		E				CE		E		,			
X		1979-80 RANGE	CLOSE BEC 3	MET	PCT	X C		1979-80 RANGE	DEC 3	WEEK	PET	C		1979-80 RANGE	DEC 3	WEEK	WEEK PC1
H		(1)	1980	CHNSE	CHHIGE	H		(1)	1980	CHNGE	CHNGE	н		(1)	1980	CHNGE	CHNGE
	COP	PUTER SYS	TEMB				SOFTW	ARE & EDP :	SERVICES								
A	ANDAHL CORP BURROUGHS CORP	15- 42 47- 88	35 5/8	+1 1/4	-3.0	0	ADVANCED COMP TECH AMACOMP INC	7- 24	5 3/8	+ 1/2	+10.2 +5.2	1 0	DATA ACCESS SYSTEMS BATAPRODUCTS CORP	6- 20	18 3/4	- 3/8	-1.
Ö	COMPUTER AUTOMATION	9- 27	24	- 1/4	-1.0	0	AMALYSTS INTL CORP	3- 14	13 1/2	41 1/2	412.5	0	DATUM INC	2- 5	4	- 1/4	-5.
N	CONTROL BATA CORP	35- 77	69 1/4	-4 1/4	-5.7	A	APPLIED BATA RES.	6- 24	22	11 3/8	16.6	0	DECISION DATA COMPUT	2- 6	5 1/4	+ 5/8	
0	CRAY RESEARCH INC	30-103	99 5/8	+ 3/8	40.3	H	AUTOMATIC DATA PROC	31- 52	49	- 1/4	-0.5	0	BELTA BATA SYSTEMS	1- 3	1 7/8	+ 1/8	47.
N	DATA GENERAL CORP	46- 87	70 7/8	-5 3/4	-7.5	0	CBA COMPUTER ASSOC	9- 17	13	-3 1/2	-21.2	N O	DOCUMATION INC DATARAH CORP	7- 27 6- 37	10 3/4	- 1/8	-1.
H	DIGITAL EQUIPMENT	44-115 52- 98	87 1/2	-6 1/4 -3 3/4	-5.4	0	COMPUTER HORIZONS COMPUTER NETWORK	4- 9	2 5/8	- 7/8	0.0	l N	ELECTRONIC M & M	3- 9	0 5/0	- 1/8	-1.
NA	EECO INC	6- 16	16	-3 3/4	0.0	1 8	COMPUTER SCIENCES	11- 30	16 3/4	0	-11.6	0	EVANS & SUTHERLAND	21- 83	72	-4 1/2	-5.
Ñ	ELECTRONIC ASSOC.	4- 12	8 1/2		0.0	1 0	COMPUTER TASK GROUP	1- 23	20 1/2	-1 1/2	-4.8	0	FABRI-TEK	1- 4	1 7/8	- 3/8	-16.
N	FOUR-PHASE SYSTEMS	20- 49	26 1/4	+ 1/2	+1.9	0	COMPUTER USAGE	2- 10	6 3/4	- 1/2	-6.8	0	GENERAL COMPUTER SYS	1- 7	6	0	0.
N	FOXBORO	31- 59	57 1/2	-1 1/4	-2.1	0	COMPUT AUTO REP SVC	4- 11	10 1/2	- 5/8	-5.6	0	GEN'L DATA COMM IND	8- 22	21 1/4	+ 1/4	+1.
0	GENERAL AUTOMATION	7- 19	9 1/4	- 5/8	-6.3	0	COMSHARE	11- 21	16 1/2	+ 1/4	+1.5	0	BENERAL TERMINAL CP	1- 4	1 3/4	- 3/8	-20.
0	GRI COMPUTER CORP	1- 3	1 1/8	0	0.0	0	CULLINANE CORP	18- 45	35 3/4	-2-1/4	-5.9	N	HAZELTINE CORP	12- 33	26 3/8	-1 3/8	-4,
96	HEWLETT-PACKARD CO	46- 95	91 5/8	- 3/8	-0.4	0	DATA DIMENSIONS INC	1- 6	1 3/8	+ 1/8	+10.0	N	HARRIS CORP	25- 55 9- 15	53 1/4	+1 - 3/4	+1.
N	HONEYWELL INC	65-104 50- 79	100	-1 1/2	-2.1	0	DATATAB DEI CORP	1- 4	1 1/8	0	0.0	1 0	INFORMATION INTL INC	23- 50	43 1/2	-3 1/4	-6.
n	MAGNUSON COMP SYSTS	20- 45	42 1/4	-1 1/4	-2.8	1 4	ELECTRONIC DATA SYST		32	- 1/8	-1.4	0	INTERSIL	13- 34	33 1/2	- 1/4	
N	HANAGEMENT AGSIST	9- 25	16 5/8	-1 5/8	-8.9	1 6	INFORMATICS INC	9- 25	23 3/4	~ 1/2	-2.0	1 6	LUNDY ELECTRONICS	4- 17	13 1/8	+2 5/8	
D	HANUFACTURING DATA S	22- 80	77 1/4	-2 1/4	~2.8	0	INSYTE CORP	1- 3	2 3/4	+ 5/8	127.4	1 "					
						0	IPS COMPUTER HARKET.	2- 4	3	0	0.0	0	MSI DATA CORP	5- 16	13 5/8	-1 1/4	-0.
0	MINI-COMPUTER SYST	2- 6	2 1/4	- 5/8	-21.7	0	KEANE ASSOCIATES	3- 9	3 1/4	- 1/2	-8.6	H	MEMOREX	10- 34	14 3/4	+ 5/8	
0	HODULAR COMPUTER SYS	9- 31	25 7/8	-1 3/8 -3 1/4	-5.0	0		1- 5	3/4	0	0.0	N O	MOHANK DATA SCI OMEX	2- 12	24 3/8	-2 5/8 -1	-9.
N	NCR PRIME COMPUTER INC	15- 59	55 1/2	- 3/8	-0.4	A	LOGICOM	12- 30	29 1/2	- 3/8	-1.2	1 %	PARADYNE CORP	9- 33	29 3/8	-2 1/4	-7.
5	PERKIN-ELMER	26- 70	66 1/2	-1 1/2	-2.2	0	MATHEMATICA INC MATHEMATICAL APP GRP	5- 18 7- 33	13 1/2	-1/4	-1.8	1 2	PENRIL CORP	9- 15	13 7/8	- 1/2	-3.
ä	SPERRY CORP	42- 60	50 1/8	-1 3/4	-2.9	l ő	HATIONAL DATA CORP	10- 31	29 7/8	+ 3/8	41.2	1 0	RAMTEK CORP	10- 23	22 3/4	42 3/4	
A	SYSTEMS ENG. LABS	11- 53	32 3/4	+6 1/4		H	PLANNING RESEARCH	5- 13	10 3/8	-1 1/8	-9.7	0	RECOGNITION EQUIP	5- 21	18 7/8	-1 5/8	-7.
0	TANDEM COMPUTERS INC		67 1/2	+ 1/4	+0.3	0	PROGRAHHING & SYS	3- 1	3/4	0	0.0	0	SCAN DATA	1- 5	1 3/0	- 1/4	-17.
N	TEXAS INSTRUMENTS	79-150	139 1/2	-6 5/8	-4.5	0	RAPIDATA INC	4- 10	9 1/4	- 1/2	-5.1	N	STORAGE TECHNOLOGY	12- 26	24 1/4	-1	-3.
A	WANG LABS.	17- 40	38 1/4	-3 1/4	-7.8	0	REYNOLDS & REYNOLD	21- 34	22 1/2	-1 1/2	-6.2	0	SYKES DATATRONICS	14- 50	21 3/4	+ 3/4	+2.
						0	STEC INC	6- 24	24 1/4	+ 1/2	+2.1	0	T BAR INC	14- 24	4 3/4	-1	0.
	LEA	SING COMPA	WIFE			1 0	SCIENTIFIC COMPUTERS TYMSHARE INC	6- 32 34- 88	32 1/4 85 1/8	- 7/8	+18.3	1 2	TENTRONIX INC	42- 70	63 3/8	-1 3/8	-2.
	LEN	DIND CONT.	MAES			1 "	URS CORP	5- 17	16 1/2	- 3/8	-2.2	1 10	TELEX	3- 6	5 1/4	- 3/4	-12.
D	BOOTHE FINANCIAL CP	13- 27	22 1/4	0	0.0	N	WYLY CORP	4- 20	16 3/8	- 1/4	-1.5	0	TESDATA SYSTEMS CP	0- 26	13 3/8	-1 1/4	-0.
80	COMBISCO INC	6- 24	24	+1 3/8		1						A	TIMEPLEX INC	7- 33	32 7/8	+1 3/8	+4.
A	COMMERCE GROUP CORP	1- 2	7/8	- 1/8		1						0	WILTEK INC	1- 3	2 1/4	4 1/8	+5.
A	COMPUTER INVSTRS GRP	1- 4	3/4	-1	-57.1	1	PERIPH	ERALS & SU	BSYSTEMS								
0	CONTINENTAL INFO SYS	2- 15 2- 5	4 7/8	0	0.0	1						1	SUPPLY 1	TES & ACCE	2379022		
H	DATRONIC RENTAL BCL INC	3- 6	4 1/2 2 7/8	+ 1/4		I N	AM INTERNATIONAL	13- 24	15 1/8	-1 1/2	-9.0	1	BUFFL	IES & MULLE	COLINOGE		
N	BPF INC	5- 12	6 1/4	- 3/8		N	AMBERSON JACOBSON	14- 36 9- 25	24 7/8	+2 1/4	19.9	I A	AMERICAN BUS PRODS	9- 15	14 5/8	+ 1/4	42.
M	ITEL	1- 15	1	- 1/8		12	APPLIED DIG DATA SYS		11 7/8	0	0.0	0	BALTIMORE BUS FORMS	1- 2	1	0	0.
ö	LEASPAC CORP	1- 2	5/8	0	0.0	0	AUTO-TROL TECHNOLOGY		49	0	0.0	N	BARRY WRIGHT	8- 22	19 1/4	-1 3/8	-6.
A	PIONEER TEX CORP	2- 4	3 5/8	0	0.0	0	BEEHIVE INT'L	3- 28	26	+2	48.3	0	CYBERMATICS INC	1- 2	7/8	- 1/4	-22.
N	RELIANCE GROUP INC	24- 79	72 1/4	-1	-1.3	A	BOLT-BERANEK & HEW	12- 37	34	-1 3/4	-4.8	A	DUPLEX PRODUCTS INC	11- 16	13 5/8		0.
鞍	U.S. LEASING	12- 24	25	+1 5/8	46.9	H	BUNKER RAHO	17- 41	38	-1 5/8	-4.1	111	ENNIS BUS. FORMS	13- 21	16 1/4	- 1/8	-0.
						0	CAMBRIDGE MEMORIES	1- 9	3	+ 1/8	+4.3	N	HOORE CORP LTD	46- 63 27- 37	34 1/2	- 3/8 +1 1/4	+3.
						1 7	CENTRONICS DATA COMP		5 7/8	-1 5/8	-5.8	I N	NASHUA CORP	20- 35	24 7/8	- 1/4	-0.
						10	COMPUTER DEVICES INC		7 1/8	+ 1/8	+1.7	0	STANDARD REGISTER	22- 35	30 1/4	- 1/2	-1.
						0	COGNITRONICS	1- 10	9 3/4	- 1/4	-2.5	A	TAB PRODUCTS CO	9- 30	28 1/8	41 3/4	16.
						0	COMPUTER COMMUN.	4- 10	2 7/8	- 1/2	-14.8	N	WABASH MAGNETICS	11- 30	30	43 1/2	
						0	COMPUTER CONSOLES	4- 29	23	- 3/4	-3.1	N	WALLACE BUS FORMS	12- 26	23 1/4	+ 1/2	+2.
E	XCHI N=NEW YORKI A=AHE	RICANI P-F	PHIL-BALT-	WASH		0	COMPUTER TRANSCEIVER		4 7/8	. 0	0.0	1					
	L=NATIONAL # M=MID	WEST# 0=04	VER-THE-CO	DUNTER		I N	COMPUTERVISION CORP	24- 92	75 1/4	-5 1/2	-6.0						
	-T-C PRICES ARE BID PR				ID	N.	CONRAC CORP	13- 25	18 5/8	-1	-5.0						
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- ____ The B-300/B-600 (low cost bands)
- ___ The 2550 (1500 lpm Charaband)
- ___ The 2200 Family (300, 600, 900 lpm drum)
- ____ CT-1200 Family (600, 1000, 1200 lpm ChainTrain)

My needs are

Immediate__3-6 months__For information only___

My computer type is____

Name_

Company

Address

City_

__State__

Zip_

